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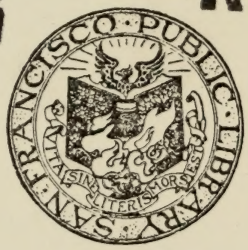

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VOLUME ONE

Appendix to the Journal of the Assembly

LEGISLATURE OF THE STATE OF CALIFORNIA
1959 REGULAR SESSION

REPORTS

January 5, 1959-June 19, 1959

HON. RALPH M. BROWN
Speaker

HON. CARLOS BEE
Speaker pro Tempore

HON. WILLIAM A. MUNNELL
Majority Floor Leader

HON. JOSEPH C. SHELL
Minority Floor Leader

ARTHUR A. OHNIMUS
Chief Clerk of the Assembly

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1957-1959

VOLUME 1 NUMBER 3

REPORT OF THE

ASSEMBLY INTERIM COMMITTEE ON CIVIL SERVICE AND STATE PERSONNEL

House Resolution No. 222, 1957

CIVIL SERVICE AND PERSONNEL MANAGEMENT

LIFE INSURANCE AND MEDICAL CARE INSURANCE

MEMBERS OF THE COMMITTEE

SAMUEL R. GEDDES, *Chairman*
THOMAS J. MacBRIDE, *Vice Chairman*

Montivel A. Burke
William A. Marsh
Roy J. Nielsen
Phillip Burton
Charles W. Meyers
Howard J. Thelin
Vincent Thomas

Compiled by
HELEN NELSON

February, 1959

Published by the
ASSEMBLY
OF THE STATE OF CALIFORNIA

HON. RALPH M. BROWN
Speaker

HON. CARLOS BEE
Speaker pro Tempore

HON. WILLIAM A. MUNNELL
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Chief Clerk of the Assembly

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LETTER OF TRANSMITTAL

February, 1959

HONORABLE RALPH BROWN
Speaker of the Assembly
State Capitol, Sacramento, California

MR. SPEAKER AND MEMBERS OF THE ASSEMBLY: Purusant to House Resolution No. 222 of the 1957 General Session, directing the Assembly Interim Committee on Civil Service and State Personnel to ascertain, study and analyze facts relating to the State Civil Service System and state personnel, your committee transmits herewith the final report of its findings, conclusions and recommendations.

Legislation recommended by the committee is set forth in the report, along with Committee observations and Committee recommendations for further study.

Legislative action has not been recommended for many of the subjects studied because legislative action has been deemed unnecessary or inappropriate at this time, or because further research and study appear necessary.

Transcripts of the hearings and other information submitted are available in the office of the Chairman of the Committee, Samuel R. Geddes, Room 2140, State Capitol, Sacramento, California.

Respectfully submitted,

SAMUEL R. GEDDES, Chairman
MONTIVEL A. BURKE
WILLIAM A. MARSH
ROY J. NIELSEN
VINCENT THOMAS
THOMAS J. MACBRIDE, Vice Chairman
PHILLIP BURTON
CHARLES W. MEYERS
HOWARD J. THELIN

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INTRODUCTION

The work and services of government must be performed primarily through people. For this reason, a soundly conceived personnel management program is of primary importance. No duty or responsibility of management is of greater single importance than the management of its personnel and none should receive greater attention.

The State of California spends in the neighborhood of $500,000,000 each year for the salaries and wages of its employees. More than 85,000 persons (not including employees of the University of California) are employed by the State, 12,000 of these being in management or supervisory positions. With an investment of this size, the State has an obvious obligation to develop the most effective personnel management possible.

Under the Constitution the Legislature has the responsibility of maintaining the civil service. The Assembly, in recognition of the magnitude and importance of the State's personnel management program, constituted the Assembly Interim Committee on Civil Service and State Personnel, through House Resolution No. 222, 1957 Regular Session. This committee was authorized to ascertain, study and analyze, "all facts relating to the State Civil Service System and state personnel, including the rights and duties of and benefits for such personnel, and any matter bearing thereon, including but not limited to the operation, effect, administration, enforcement and needed revision of any and all laws in any way bearing upon or relating to the subject of this resolution, and to report thereon to the Assembly, including in the reports its recommendations for appropriate legislation."

COMMITTEE WORK PLAN

The committee's work plan was designed to make a thorough and detailed inquiry into the State's personnel management program.

Many facets of personnel management in state service, as evidenced by the State's several agencies, were reviewed and studied. The extent to which the civil service procedures of state laws and regulations contribute to or impede the most effective personnel management was a subject of particular interest in the committee's inquiry.

Expressions and suggestions from departmental directors, personnel officers, first-line supervisors, representatives of the State Personnel Board and the California State Employees Association were sought and received.

Particular and detailed attention was directed to employee benefit programs as a part of modern personnel management.

Regarding the goal of the committee's work, Chairman Geddes made the following statement:

> "As the work and investigation of the Assembly Interim Committee on Civil Service and State Personnel, of which I have the privilege of being chairman, has progressed, it has become increasingly evident that constructive and long-range planning for the proper recruitment, training, and utilization of state personnel is vitally necessary.
>
> "The people of the State of California have a large investment in their State Government. Only with the best and most advanced personnel management system can we retain in state service enough individuals who possess the necessary talent and ability to carry on the government of this great State and serve the people as they have the right and expectation of being served."

COMMITTEE HEARINGS

The committee held hearings in Los Angeles on October 24 and 25, 1957; in San Francisco on September 23 and 24, 1957; in Sacramento on January 16 and 17, 1958; and in Los Angeles on November 24 and 25, 1958.

The committee desired to obtain information on problems facing the Civil Service and State Personnel System. Directors of state agencies were invited to suggest areas where improvements could be effected. First-line supervisors and managers were also invited to attend the meetings and give testimony on the problems facing them. Representatives of the State Personnel Board, the California State Employees' Association and various other agencies submitted information.

The January 16 and 17, 1958, meeting in Sacramento and one of the two-day meetings in Los Angeles in November, 1958, were devoted to consideration and study of a health and welfare program.

At the opening of the first hearing on this subject, Chairman Geddes stated:

> "One of the most significant developments in the last decade in employer-employee relations in private industry has been health and welfare programs. Included in the different programs or plans are one or more of a variety of benefits such as hospital, medical, pensions, unemployment and disability benefits. *The objective is to provide the finest health and welfare program available for state employees.*"

More than 30 insurance firms and medical care organizations were invited to be present at the hearing in Los Angeles in November, 1958. Each received with the invitation a statement indicating specific policy problems on which the committee was seeking counsel at that time.

The thoughtful and generous response the committee received was most gratifying and helpful. Not only at the hearing, but later, as well, carefully written and detailed advice was submitted. Both the testimony and the written submissions were valuable aids to the committee's work, and their careful perusal has contributed to many of the conclusions and recommendations contained herein.

COMMITTEE RESEARCH

Members of the committee have consulted a number of departmental directors and personnel managers, members of the staff of the Legislative Analyst and ranking executive personnel and members of the State Personnel Board staff.

Recent books and literature in the field of personnel management were reviewed to bring to light the best of modern practices.

In addition, the committee requested and received information from other states and foreign countries on personnel practices, and health and welfare programs, and conducted intensive research into the problems and complexities of these programs, in California and abroad.

Testimony of witnesses during the hearings before the committee, in many instances, developed areas which required further study and inquiry.

Two detailed reports submitted by the State Personnel Board to the committee are available for inspection in the offices of the chairman of this committee.

The committee takes this opportunity to thank all of the persons who have given so generously of their time to help make the study of the committee constructive and worthwhile.

SUMMARY OF RECOMMENDATIONS

CIVIL SERVICE

Recommendation No. 1. The committee recommends review and analysis of the State's recruitment policies for entrance level jobs, with particular regard to the need for maintaining quality standards for persons entering upon a lifetime of state employment.

Recommendation No. 2. The examination system for job applicants should be reviewed periodically, and responsibility for effective examining should be more precisely fixed within the State Personnel Board.

Recommendation No. 3. It is recommended that the Legislature require from the State Personnel Board an annual report on the modifications the Board has made in the Civil Service examining process. The report should include a description of the effects of these modifications on state employment practices.

Recommendation No. 4. The traditional employee examining methods should be studied to determine if general improvements might be made in the examining process on the basis of experience with selected classes under the "continuous testing" procedure.

Recommendation No. 5. The committee recommends that the State Personnel Board acknowledge requests from operating agencies for classification determinations and calendar them for determination in the order of their receipt.

Recommendation No. 6. The committee recommends that present laws and rules on leaves of absence for short-term military duty be revised by adapting them to changes in national policies which have taken place since the State's present military leave practices were formulated.

Recommendation No. 7. The committee recommends for further study the entire subject of leaves of absence from state service, with pay and without pay.

Recommendation No. 8. The committee recommends legislation to amend Section 18950 of the Government Code to provide specifically that persons on leave of absence may be permitted to compete in promotional examinations.

Recommendation No. 9. The committee recommends detailed inquiry to determine whether our 25 years' experience with the present procedure for disciplinary action indicates any changes that could be made to permit a less legalistic approach to discipline and discharge in state agencies, while still safeguarding our merit system.

Recommendation No. 10. A citizens' committee should be constituted and instructed to review the principles, concepts and procedures embodied in the State's civil service laws, rules, and regulations.

PERSONNEL MANAGEMENT

Recommendation No. 1. A clear declaration of policy should be issued by the Governor, assuming responsibility as the State's Chief Executive, for management of the State's personnel.

Recommendation No. 2. It is recommended that the Governor's declaration of policy make clear that the primary role of the Personnel Board is, in a staff capacity, to assist management to fulfill its responsibilities.

Recommendation No. 3. It is also recommended that the Governor include, in substance, in his policy declaration that each department head is to be held fully responsibile by the Chief Executive for day-to-day administration of the personnel management program within his department, and that each department head is directly responsible for the full utilization of employee abilities, for maintaining a high morale, for giving worthy motivation and providing opportunity for individual development, all to the end that the State's population may be well served by its State Government.

Recommendation No. 4. It is recommended that an appropriate Assembly committee conduct investigations and hear evidence to determine whether any legislation is necessary to establish full executive responsibility for personnel management.

Recommendation No. 5. The committee recommends that high priority be given to the development of a program of incentive rewards to state employees for outstanding qualifications, attainments and service on the job.

Recommendation No. 6. The committee recommends that needless and costly duplication of effort among the several state departments be eliminated by centralizing personnel services wherever practicable.

Recommendation No. 7. It is recommended that some further overall review be made of the administrative structure and staffing of the training responsibility in each state department.

Recommendation No. 8. The committee recommends that a proper subject of inquiry for an appropriate Assembly committee would be an inquiry into the manner of and the extent of the implementation of departmental training policies.

Recommendation No. 9. There should be a clear statement of policy that the primary function of a personnel officer in a state department is to assist departmental management in performing its line functions and that he is not an agent of the State Personnel Board.

Recommendation No. 10. The committee recommends periodic audit and inspection of the personnel management practices of the state agencies and careful review of the audit report by the top management of State Government.

LIFE INSURANCE

Recommendation No. 1. It is recommended that the Legislature take no action at this time toward sharing in the cost of employees' group life insurance.

MEDICAL CARE INSURANCE

Recommendation No. 1. The State should establish and administer a medical care insurance program for the employees of the State.

Recommendation No. 2. Primary among the purposes the State should seek to accomplish by the establishment of a medical care plan for state employees is the protection and improvement of the health of employees and their families.

Recommendation No. 3. The program should be designed to meet the needs of state employees, thus enabling the State to attract and retain able employees by increasing the rewards of state employment.

Recommendation No. 4. Avenues through which employees can advise the State of their medical care insurance needs and desires should be clearly and permanently established.

Recommendation No. 5. A person or persons within the executive branch of the State Government should be clearly designated as responsible for receiving, considering and acting upon the employees' expressions of needs and desires in their medical care insurance program.

The above recommendations are made from the employer viewpoint of good personnel management.

The committee makes the following further recommendations from the point of view of State Government.

Recommendation No. 6. Administration of the program is the State's responsibility because some state moneys will be spent. State moneys should be spent with no less scrutiny and concern on this program than on any other.

Recommendation No. 7. The State should recognize a responsibility to its many smaller political subdivisions and establish the plan at the outset to permit them as well as other local public jurisdictions to enroll their employees, in a manner similar to that now commonly practiced in the State Employees Retirement System.

Recommendation No. 8. The State-sponsored program established should meet the following basic standards:

A. The basic principle of insurance should be honored.

B. Employee choice of basically different methods of providing medical care services should be provided.

C. When one company or organization is to be selected from among several offering similar coverage, competitive bidding should determine the one selected.

D. An employee's right to enroll should be a condition of his employment, just as is his right to vacation credits, sick leave and membership in the retirement system.

E. The program should be designed to allow the highest possible share of the money spent to go for medical care and the least possible for claims form filing and processing.

F. To the extent that claims forms are necessary to the administration of an employee's rights to medical care or medical care

benefits, these should be administered by the departmental personnel offices in a manner similar to those for other employee benefits.

G. No need form nor means test should be permitted to determine the level of benefits an employee can receive.

H. Any employee's health care program should take into consideration the needs of the total family.

I. The importance of the problem of medical and hospital care after retirement should receive the most careful consideration.

   a. Total costs for the entire group of state employees, including retired employees, might be distributed over the entire state employee group, including those who are not retired.

   b. Continuity of medical and hospital coverage could be provided as an additional feature of the existing retirement program for state employees, so that during his working years each employee would generate resources to finance a medical and hospital supplement to his retirement program.

J. Continuity of coverage should be maintained when serious illness or injury of an employee may involve a prolonged but not permanent period of disability.

K. There should be an adequate appeals procedure as a check against the arbitrary or unjust denial of benefits.

L. Any state-sponsored medical care program for state employees should include provision for evaluating the quality of medical care which is being bought and the extent to which the types of benefits bought meet the employees' health care needs.

M. Since many state employees are carrying health insurance plans now at their own expense, care should be taken to avoid interruption of coverage during the initial establishment of a state-sponsored program. The committee does not believe the automatic blanketing in existing plans with sizable membership by a "grandfather clause" is necessary or advisable.

N. Consideration should be given to the suggestion that any medical care insurance program for the employees of the State should contain a "deductible" provision to the end that the cost of the first and possibly the second office or home call of a doctor for medical service incurred for illness as distinguished from accidents shall be borne by the employee rather than by the medical health insurance program.

COMMITTEE OBSERVATIONS

On the basis of investigation, research, and evidence presented at hearings, the committee makes these observations:

1. That most state employees know their jobs and do their work well.

2. That the California Civil Service System, as established in Article 24 of the State Constitution, and as it has been developed over the years since, is widely considered to be the best civil service system in the country.

3. That civil service as an institution is not sacrosanct. It is subject to scrutiny and improvement like everything else. Too often the person who is bold enough to suggest that California's Civil Service System might not be perfect is immediately assailed as an "enemy of civil service" and as advocating a return to the "spoils system." A receptive attitude to constructive criticism can lead to further development. Refusal to brook any comments but flattery can lead to stagnation and decay.

4. That civil service makes good personnel management in government possible. It does not automatically produce good personnel management.

5. That the practice of large private companies so far as selection and retention of employees is concerned has grown more and more similar to the civil service procedures of government. Competitive selection on the basis of qualifications, often with the use of written and oral examinations, is common in the large corporation today. Employee appraisal programs and advancement dependent upon supervisors' performance ratings have been installed in many business organizations. Likewise, schedules for determining the order of retention in case of layoff exist in many a personnel office and are recorded in many a labor-management agreement.

At the same time that private industry has been adopting many of the features of civil service in their own employment practices, they have also been aggressively studying and developing techniques of personnel management.

During the same period, management in state government has tended to persuade themselves and others that nothing can be done toward developing an effective personnel management program because of the civil service system.

6. The performance rating system in state service leaves much to be desired. In general, some supervisors make the ratings without much consideration for real merit. More often than not the whole business is automatic and routine, with favorable reports given employees without regard for the true character of their work. In some cases, supervisors do the grading without observing an employee's work and perhaps, without even setting eyes on him from one report period to the next.

We have had recent cases in which an agency had given an employee a uniformly superior rating for year upon year only to discover very

suddenly, when it finally wanted to fire the employee, that he or she had all along been doing things that warranted discharge.

Many supervisors lack the courage, or whatever it takes, to recommend the discharge of an inefficient or lazy employee during his probationary period. This has resulted in the State being burdened with employees who cannot, or will not, do their jobs in honest fashion. Once past the probationary period an unsatisfactory employee can be gotten rid of, but only with great difficulty and at considerable expense to the State.

These are matters involving civil service situations, but they do not arise merely because of civil service. They are evidence of poor personnel management.

Perhaps some of these conditions could be improved through more care by department heads in selecting supervisors and in giving supervisors more training. Supervisors have too often been picked on the basis of seniority whether or not they have any talent for direction or the will to exercise authority. Then should the agency be criticised for any failure to serve the people of the State properly, the department head will plead "civil service" as his defense.

7. That employees are responsive to clear and effective leadership.

8. That the quality and effectiveness of personnel management programs in the operating agencies are determined by the value placed on such programs by top governmental management.

9. The committee's last report made the observation that while no one doubts who speaks for employees of the State, there is widespread doubt about who speaks for management. This regrettably is equally true still.

10. Failure to centralize personnel management responsibility is resulting in duplication of effort in training, orientation, and probably other programs.

11. That the State of California lags behind the State of New York, the State of Minnesota, the City of New York, the City of Philadelphia and the Federal Government of Canada, which all now have an officer designated by the chief executive to represent management in dealing directly with employee groups and in developing a personnel management program.

12. That experience under the authority granted by the Legislature has now amply demonstrated that recruitment, testing, and employment practices can have flexibility and can be tailored to a considerable extent to the needs of the operating agencies, without endangering or threatening our civil service system.

13. The committee's last report, in treating of agency responsibilities, called attention to the need for orienting new employees in the policies of the agency, the objectives of the agency and the manner in which the work of the agency is performed.

Since that report, development of orientation programs has taken place more rapidly than had been anticipated.

The Personnel Board has issued a personnel management guide entitled, "Orientation, a Planning Guide." This contained information which has been of assistance in enabling agencies to develop their orientation programs.

While not all agencies have planned orientation programs for their employees, the lack of such a program is becoming quite unusual. It is possible that more attention should be paid in some cases to the quality of orientation, but definite progress has been made in this important endeavor.

14. The operating agencies have assumed the cost and responsibility for some of the recruitment and testing responsibilities formerly performed by the State Personnel Board staff.

15. Failure to develop an effective means of registering employees desiring transfers and reinstatements results in valuable and trained employees being passed over for openings. It would appear a disinterested third party could perform a real service by receiving requests from employees wishing transfers and former employees wishing reinstatement and maintaining a register of these persons to which employing agencies could refer.

In order that the State may make maximum use of trained and qualified employees, it is important that the right of the employing agency to select be maintained. At the same time, the right to select from the best qualified who are available should likewise be maintained, and this includes qualified persons desiring transfers and reinstatements.

16. The committee's last report recommended that Section 222.5 of the Labor Code be amended to provide that the State as well as private employers pay the fee for pre-employment physical examinations. Nonetheless, the State continues to ignore a responsibility it places by law upon all other employers.

17. In the last session of the Legislature, Section 13926 of the Government Code was amended authorizing merit awards for superior accomplishment in accordance with procedures to be established by the Personnel Board. No procedures have yet been established.

18. Management review of the rate of turnover and the causes of turnover appears to be absent from State Government, yet these factors are used widely by top management in private industry in evaluating and shaping personnel management policies and practices.

19. The Division of Industrial Safety, Department of Industrial Relations, is authorized in the Labor Code with "the power, jurisdiction, and supervision over every employment and place of employment in this State * * * to enforce and administer all laws * * * requiring such employment and place of employment to be safe, and requiring the protection of the life and safety of every employee in such employment or place of employment." The division is concerned with the job safety of some five million workers in our State.

The chief's salary is established by the Legislature. Salaries for the 150 engineers under the chief's direction are set by the State Personnel Board. A serious salary compaction problem has developed at the supervisory levels and exists also at the field engineer level. Generally the supervisory differential for engineers in state service is at least three salary steps or 15 percent but the supervisory positions in the Division of Industrial Safety have only a one- or two-step salary differential (5 or 10 percent) over the positions they supervise. See chart on page 17.

Civil service salary ranges	General engineering classes	Division of Industrial Safety	Department of Public Health
$1,400-$1,500	State Highway Engineer		
1,350- 1,450			
1,300- 1,400	Deputy State Highway Engineer		
1,250- 1,350			
1,150- 1,300	Assistant State Highway Engineer Metropolitan area highway engineer		Chief, Division of Environmental Sanitation
1,100- 1,250			
1,050- 1,200	Principal engineer		Bureau chiefs
1,000- 1,150			
950- 1,100			
905- 1,050	Supervising engineer		Supervising sanitary engineer
921- 1,000		*Chief (1,000)	
782- 950			
745- 905	Senior engineer	Assistant chief	Senior sanitary engineer Senior industrial hygiene engineer
710- 862		Supervising safety engineer	
676- 821			
644- 782	Associate engineer	District safety engineer	Associate sanitary engineer
613- 745	Engineering associate	Industrial hygiene engineering associate	Industrial hygiene engineering associate Sanitary engineering associate
584- 710			
556- 676		Safety engineer	
530- 644	Assistant engineer		Assistant sanitary engineer Assistant industrial hygiene engineer
505- 613			
481- 584			
458- 556			
436- 530	Junior engineer (481-530)	Junior safety engineer (481-530)	Junior sanitary engineer (481-530)

* Exempt position

PART I

CIVIL SERVICE AND PERSONNEL MANAGEMENT

CIVIL SERVICE

It is civil service that makes good personnel management in government possible. It does not automatically produce good personnel management.

The term "Civil Service" is intended here to denote the procedural system through which the principle of merit employment in government is expressed. It refers to that "general system based upon merit, efficiency, and fitness as ascertained by competitive examination" by which Article XXIV of the State Constitution requires appointments and promotions be made.

This committee is satisfied that within state employment there is general compliance with the civil service laws, rules, and regulations. The committee's inquiry has been concerned with the effectiveness of our civil service procedures as a system for staffing state agencies and fixing the basic rules of personnel management. Our interest was in learning how well our civil service system serves as an aid to good personnel management and how it can serve more effectively.

RECRUITMENT

Recommendation No. 1. Adequate service to the people in the State depends upon adequate employees. The committee recommends review and analysis of the State's recruitment policies for entrance level jobs, with particular regard to the need for maintaining quality standards for persons entering upon a lifetime of state employment.

In an organization governed by civil service, with its emphasis on promotion from within, recruitment occurs essentially at the entrance level—at the bottom of the ladder. Much less often than in private industry does a government agency go outside of its own organization to fill supervisory and administrative jobs. From this year's recruits on various entrance levels will come supervisors of future years. Since the supervisors for future years are being hired now at the entrance level, they will be no better supervisors than the recruits of today can become through training and experience.

At hearings held by this committee, concern was frequently expressed about the quality of recent entrance level applicants. Spokesmen for some agencies reported that university placement officers advised it was useless for them to visit campuses to talk to members of the graduating class because state employment was not sufficiently attractive to compete with other opportunities offered the new college graduate.

The civil service procedures discussed below can rate, rank, and advance only those persons who apply for and are willing to accept state employment. Good recruitment policies are the cornerstone of a good personnel program.

EXAMINING

Recommendation No. 2. The committee recommends that the examination system be reviewed periodically and that, within the State Personnel Board, responsibility for effective examining be more precisely fixed.

The examining process determines who among those applying will be eligible for state employment and the order in which those eligible may be considered for job openings. It is not known how well the written examinations are testing for the qualities needed by the agencies. It is certain, however, that the examining process is one of the most important elements in a civil service system. Probably it is also one of the most difficult. To the extent it is given less time and attention than it requires, to that extent, the quality of state civil service can deteriorate.

The committee notes a trend toward greater participation of the employing agencies in the examining process. The committee does not question that more agency participation in the examination process is necessary and or desirable. The committee recommends, however, that *the employing agency's share of responsibility should be identified, recognized and assigned.*

Recommendation No. 3. Inasmuch as the Legislature delegated to the State Personnel Board the authority to make modifications in the civil service examining process by adopting Section 18939, it is recommended that the Legislature require the State Personnel Board to report annually to the Legislature on their actions under this authorization and the effects of these actions on state employment practices.

This authority was given by the Legislature in 1951. The modifications of the traditional examining process, which the State Personnel Board has introduced, are referred to by them as "continuous testing." In a report submitted to this committee by the State Personnel Board, these procedures were described as follows:

> "Under continuous testing, various phases of the process are delegated either to State Personnel Board branch offices or to the operating agency and its subdivisions, thus bringing the candidate in a face-to-face situation where job requirements and conditions can be explained and the process gotten under way as quickly as possible. Each plan is patterned to fit the particular class and the needs of the agency using that class. One plan has proven very effective. The time required to complete the process from recruitment to referral was reduced from one week to three hours for clerks, typists, and stenographers. Under a previous plan of testing, the time for test processing had been reduced from about two months to one week. The new method simply speeded up the process."

This committee is pleased to learn that the authority given by the Legislature to the Personnel Board is serving the purpose intended—to speed up the process of getting qualified employees on the State's jobs.

The modified procedures referred to as "continuous testing" are being used primarily to recruit and test for those occupational groups which are in extremely short supply, such as stenographers, physicians, nurses, psychiatric technicians, hospital attendents, correctional officers, right-of-way agents, and junior engineers. The flexibility of the State Personnel Board staff in devising and installing shortcut, speedup methods whereby to compete for qualified applicants in short supply is commendable.

The traditional method of conducting qualification appraisal interviews is to assemble a board consisting of a representative of the State Personnel Board, a representative of the state agency in which the employment exists, and a representative of the public who has experience in the occupation or profession being rated. Originally, it was the practice to have the same interview board members travel throughout the State to interview all candidates.

Significant departures have recently been made from this traditional practice.

Most public members serve without compensation and are not always willing to travel throughout the State in order to conduct interviews. In other cases, less than three men comprise an oral board. Two-men boards, consisting of a departmental representative and a State Personnel Board representative, are now being used at times. In other cases, such as examinations for junior civil engineer, a one-man interview representative travels to various universities and conducts the interview as a one-man board.

Such modifications, as those described above, represent basic departures from the traditional civil service procedures. In the 1956-57 Fiscal Year, about one-third of the competitors who took state service examinations were tested and rated under these modified procedures.

Under the Constitution, the Legislature has the responsibility for maintaining the civil service. It ought, therefore, to review regularly any delegation of that responsibility. An annual report from the State Personnel Board to the Legislature on the examining procedure will keep the Legislature informed and provide an opportunity to give the State Personnel Board any additional policy direction.

Recommendation No. 4. It is recommended that study be given to our traditional examining methods to determine what, if any, general improvements might be made in the examining process on the basis of our experience with selected classes under the "continuous testing" procedure. The study should examine into the possibilities of establishing criteria for examination processes allowable for every class, so that selection of the type of examination to be used will rest on principle rather than upon expediency alone. Recent experience apparently has demonstrated that at least one-third of the applicants for state service can be adequately tested and referred to state employment by procedures which are briefer and more flexible than the traditional civil service procedures which were followed in all cases from the inception of civil service in 1934 until legislative authorization made the modified procedures possible in 1951.

The traditional procedures are still followed in examining about two out of three applicants for state employment.

It appears to have been mostly the varying pressures of the labor market that have determined in recent years which applicants for state service would be tested by the "traditional methods" and wait the "traditionally long time" to learn the outcome of their effort to obtain state employment, and which would be tested by the shortcut, "continuous testing" procedure, and know the outcome within a matter of days, or even hours.

It would appear that if it is possible to shorten the length of time between application and referral from a few months to a few days or

hours for a wide variety of classes ranging from clerical to highly trained professional—classes which have in common only the fact that they are currently in short supply—then it may be equally possible to shorten the length of time between recruitment and referral for other, perhaps even for all, classes.

From time to time, what is traditional needs to be subjected to fresh scrutiny and when retained, retained for some other reason than that it is traditional.

The principle of merit employment in State Government is expressed through the procedural system of civil service. That system must undergo continuing analysis, review, and modification to be flexible enough to meet the changing challenges of State Government.

CLASSIFICATION

Recommendation No. 5. The committee recommends that the State Personnel Board acknowledge requests from operating agencies for classification determinations and calendar them for determination in order of their receipt.

Management in state service does not have salary setting authority nor the discretion of job classification. The State Personnel Board has. It establishes and classifies each job title in state employment.

In the course of organizational changes, etc., an appointing authority in an operating agency often has need to submit a request to the State Personnel Board, asking for review of an existing position, to establish a new determination of job duties and/or the job's position in the pay schedule. There is an orderly procedure through which his request is submitted to the State Personnel Board. Many such requests require thorough examination on the part of an assigned staff member of the State Personnel Board and a certain proportion are carried before the board on appeal from the staff member's decision.

It is recommended that these and related submissions from operating agencies to the State Personnel Board be acknowledged and calendared upon their receipt in the State Personnel Board. With all the operating agencies making such submissions to one central decision-making body, it would serve to maintain the full confidence of the operating agencies and the employees in the fairness and impartiality of the State Personnel Board, if these requests were acted upon in an order assigned upon receipt.

It is further suggested that the board issue sufficient and regular notices upon the status of the backlog to enable the operating agency which made the request and the employee or employees concerned, to know approximately when their request will be examined and decided.

LEAVES OF ABSENCE

Recommendation No. 6. The committee recommends that present laws and rules on leaves of absence for short-term military duty be revised by adapting them to changes in national policies which have taken place since the State's present military leave practices were formulated.

The original intent of the paid 30-day military leave allowance was, no doubt, to permit state employees to serve their country as members of the reserve by removing the possibility of financial hardship when

called for short-term active duty. It is no less the intent of this committee.

Since Section 395 of the Military and Veterans' Code was adopted, however, many changes have taken place in the form of active duty by reserve members of the services. Changes have also been made in the rate of compensation for active duty.

The committee recommends that, in the State's interest, Section 395 be updated to reflect present policies and practices in the military service.

The committee further recommends that, as a principle, short-term active military duty and jury duty be subject to similar leave provisions.

Recommendation No. 7. The committee recommends for further study the entire subject of leaves of absence from state service, with pay and without pay.

Presently, the authority of both the appointing power and the State Personnel Board to grant leaves of absence, either with or without pay, is strictly limited. There is a growing acceptance now of the point of view that policies concerning leaves of absence are an important element of personnel management in any career service.

As recommended in this committee's previous report, the last session of the Legislature passed legislation permitting state agencies to grant educational leaves with pay. The purpose of this legislation was to make it possible, under careful controls, for state administrators to attend advanced management courses and conferences and for key technical employees to obtain advanced training in technological and professional developments.

This has, as expected, been used in a quite limited way to date, but already has enabled the State to send a few selected persons to classes on radiological problems and other vital subjects.

The amount of military-leave pay drawn annually by state employees has been about $400,000. Employees who draw military leave pay also receive compensation from the Defense Department for the same period for their military service.

There are some instances in private industry of granting leaves of absence to employees with long service, and of granting occasional leaves as a reward for outstanding service. Where granted, such leaves are justified on the basis that they contribute to the morale of all the employees, they help to reduce turnover, and the increased productivity of all the employees during their many years on the job can far outweigh the cost.

The committee recommends that the State's total leave program be reviewed and that very serious consideration be given to ways of developing a rounded program on leaves of absences, paid and unpaid, directed toward serving the State and the career service of state employment.

Recommendation No. 8. Section 18950 of the Government Code should be amended to provide specifically that persons on leave of absence may be permitted to compete in promotional examinations.

Persons on educational leave or contemplating such leave, for example, should not be disadvantaged or deterred should a promotional examination be scheduled during the period of the leave.

The enactment of this amendment will clarify the status of persons on authorized leaves of absence.

DISCIPLINE AND DISCHARGE

Recommendation No. 9. The committee recommends detailed inquiry to determine whether our 25 years' experience with the present procedures for disciplinary action indicates any changes that could be made to permit a less legalistic approach to discipline and discharge in state agencies, while still safeguarding our merit system.

Probably no other explanation is given as frequently for the reluctance of management in government to accept full and complete management responsibility as that, in a civil service system, discipline and discharge are not among management's prerogatives, and without these, management cannot be held fully accountable.

The committee held hearings into the matter of discipline and discharge and received testimony from many different departments of the state service. There was unanimous agreement among the state agencies reporting to the committee that it is possible to discharge a state employee under the present rules and regulations. Likewise, the present rules and regulations permit disciplining employees. While there was general agreement that it is possible to discharge or discipline an unsatisfactory employee, there can be no doubt that it is a very expensive procedure. Comments from the agencies included the following:

1. "Making out performance reports, keeping records of unsatisfactory performance, and preparing evidence for a case which will stand up, all tie up the supervisor's time. All time spent in dismissing the unsatisfactory employee is supervisory and management time of which new and satisfactory employees are deprived."

2. "While under the present procedures, disciplinary action is possible, the procedure is too legalistic and complicated for the average supervisor to handle. The time and efforts of top management and, frequently, the legal staff of the department must be involved."

3. "We should try to take some of the legal angles out of disciplinary actions. As it is now, to dismiss an employee, the department often feels that it is necessary to have the Attorney General's office sitting in."

4. "The present method of separating employees is an ultralegal approach to a personnel problem. Another type of approach would be more appropriate." One suggestion was to try "mediation and rehabilitation" first. The committee was advised that the Personnel Board presently has sufficient authorization under Section 18714 of the Government Code to provide for some mediation or other type of measures first, prior to the filing of formal legal charges. No legislation would be necessary.

The law places the responsibility on the appointing power to take disciplinary action when needed. The Personnel Board reviews only those cases where the employee appeals from the disciplinary action

taken by the appointing power. Decisions of the Personnel Board, in turn, are subject to review by the courts.

During the period of one year ending June 30, 1958, state agencies took 361 formal actions to dismiss, suspend, demote employees or reject probationary employees from their positions. Of these, rejections during the probationary period accounted for almost one-third, 125.

The other 236 were dismissed, suspended or demoted by their appointing power. Of these, 49 appealed the action to the State Personnel Board. The Personnel Board sustained the Department in 38 of the 49 cases and modified the Department action in six of the other 11. Only two Department actions were revoked. Five were pending review.

The committee recommends for further inquiry and consideration the 25-year experience with the present procedures on disciplinary action, for the purpose of determining whether changes could be made that, while still safeguarding the employees' rights, would permit a less legalistic and time-consuming approach to discipline and discharge in state agencies.

CITIZENS' COMMITTEE REVIEW

Recommendation No. 10. A citizens' committee should be constituted and instructed to review the principles, concepts, and procedures embodied in the State's civil service laws, rules, and regulations.

Twenty-five years ago the people of California wrote into California's Constitution a provision calling for merit employment. Developing over the quarter century, California's Civil Service System has come to be recognized as perhaps the best in the country. It is not from any evidence of deep dissatisfaction that this recommendation is made, but more from a sense of pride. Times and circumstances change. The old concepts and the traditional procedures should be re-examined and judged afresh by the citizen of today, according to how well they contribute to creating and maintaining the kind of State Government we want.

Using the light of 25 years' experience and looking forward to envision the services citizens will require from their State Government in future years, the Citizens' Committee should weigh the principles, concepts, and procedures of state civil service and make recommendations.

PERSONNEL MANAGEMENT

DECLARATION OF POLICY

Recommendation No. 1. A clear declaration of policy should be issued by the Governor, assuming responsibility as the State's Chief Executive, for management of the State's personnel.

This committee, after conducting hearings and making investigations, is satisfied that within the State the principles of civil service and merit employment are accepted and respected.

Yet, prideful as we have a right to be in our civil service system, there is growing awareness of an urgent need to formulate and put into effect a personnel management program in the State Government.

Civil service has given us many willing and efficient workers to serve the people, but they lack real executive leadership. There is critical need for a new and clear declaration of management's responsibility to manage personnel.

The effective management of personnel is no less a responsibility of top management than is budgetary management. Yet, today in state service, there are top departmental managers who rightfully accept responsibility for every single item their budgets request and then dismiss as a "staff function" the matter of the quality and productivity of all the personnel responsible to them.

This situation has arisen most naturally, because department heads are held accountable by the Chief Executive for their budget management, and have not been as frequently nor as directly held accountable for their personnel management.

Situations have come to the committee's attention where there was no apparent attempt to discipline employees for coming late to work, or to get from the staff a proper amount of work.

From others in top bracket positions, there was observed a tendency to destroy initiative and to curtail full potential production of state employees. Some in top bracket positions evidenced no incentive to get rid of deadwood in their organizations.

Much of the slackness which the committee has observed in personnel management within the state departments can be corrected only when the highest echelons of state management clarify responsibility for the management of state personnel.

Before the many state agencies can be severely criticised for failure in personnel management, they must first have a knowledge of what they are responsible for, and to whom they are responsible in this connection.

The time is overdue for State Government to establish a clear and definitive policy as to the functions to be performed by the line agencies and the functions to be performed by the State Personnel Board as a staff agency to the executive branch.

The fact that State Government operates under a merit system need not preclude the fixing of responsibility upon line management; civil service is no reason why the State cannot, as private enterprise does,

centralize and identify the functions to be performed by a headquartered industrial relations department as distinguished from those to be performed within the subsidiary organizations. The absence of anyone in State Government responsible for the function customarily performed by a director of industrial relations in private industry became dramatically apparent during this committee's considerations on the subject of a possible "health and welfare" program for state employees. No one came before the committee speaking for management, presenting management's concern, except a representative from the Department of Finance who presented a cost estimate which had been requested. No one from management spoke on the matter from the point of view of personnel management.

Recommendation No. 2. It is recommended that the declaration of policy make clear that the primary role of the personnel board is, in a staff capacity, to assist management to fulfill its responsibilities.

Recommendation No. 3. It is also recommended that the Governor include, in substance, in his policy declaration that each department head is to be held fully responsible by the Chief Executive for day-to-day administration of the personnel management program within his department, and that each department head is directly responsible for the full utilization of employee abilities, for maintaining a high morale, for giving worthy motivation and providing opportunity for individual development, all to the end that the State's population may be well served by its State Government.

Recommendation No. 4. It is recommended that an appropriate Assembly committee conduct investigations and hear evidence to determine whether any legislation is necessary to establish full executive responsibility for personnel management.

REWARDING OUTSTANDING SERVICE

Recommendation No. 5. The committee recommends that high priority be given to the development of a program of incentive rewards to state employees for outstanding qualifications, attainments, and service on the job.

Section 13926 of the Government Code relating to merit awards was amended in 1957 to authorize awards for superior accomplishment in accordance with procedures and standards to be established by the State Personnel Board. As of the time this report is being prepared for press, the procedures and standards have not been issued.

The committee also recommends that present law should be amended to permit, within defined limits, merit salary differentials based on special qualifications or attainment.

Any rules and regulations developed to implement the law enacted should be scrutinized frequently by a committee of the Legislature, for the Legislature has the responsibility under the Constitution for maintaining the civil service.

ELIMINATION OF DUPLICATE EFFORT

Recommendation No. 6. The committee recommends that needless and costly duplication of effort among the several state departments be eliminated by centralizing personnel services wherever practicable.

Failure to fix the responsibility for overall personnel management in State Government has led to considerable duplication of effort among the agencies. This was apparent in the committee's review of orientation materials and training manuals. Since there is no fixed responsibility for overall personnel management, each department feels the necessity of preparing training and orientation material in aspects of state service which are common to all state employment as well as those which pertain only to the department. This is needless and costly duplication.

The committee did not investigate into the extent to which departments each prepare and hold separate training sessions for the same classification of employee. Testimony presented at hearings, however, suggests that the interests of the State could better be served at times by bringing together in one training session employees from all departments who perform the same specialized or technical tasks, such as right-of-way agents. Again, centralization of responsibility for personnel management could effect economies and increase efficiency by co-ordinating departmental training efforts.

TRAINING

Recommendation No. 7. It is the committee's recommendation that some further overall review be made of the administrative structure and staffing of the training responsibility in each state department.

The committee is aware that some experimentation as well as some diversity of approach to training may be very profitable to the State. The committee is also conscious of the need to get the maximum training for the training dollar. The State cannot afford the time or the money necessary for each department to learn by trial and error from its own experience.

The committee's report in 1957 recommended that staff development and training programs be given high priority in order to develop critically needed qualified supervisory personnel. At the time that report was made, seven agencies employed training officers. Since then, seven more agencies have added training officers.

The relationship between the training officer and line management, the relationship between the responsibilities of the training officer and those of the personnel officer, and the extent, if any, of the personnel officer's responsibility for training—these should be reviewed in the light of the differing experiences of the various departments.

Testimony presented to the committee indicated that in some departments, where much training is being done, there are no training officers. Here a decision has been made for line management to retain the function of training as well as the responsibility.

This approach, it was claimed by one agency employing it, emphasizes the importance of training as a part of supervision, and makes it possible to evaluate supervisors on their ability to train subordinates. It gives line supervisors experience in training and in communication and it keeps those employees responsible for training in positions of line responsibility and therefore eligible for promotion.

A disadvantage of this approach was pointed out by another departmental spokesman. Training may get a low priority in the line supervisor's work schedule, and the press of immediate duties preclude an effective training job from being done.

Recommendation No. 8. The committee recommends that a proper subject of inquiry for an appropriate Assembly committee would be an inquiry into the manner of and extent of the implementation of departmental training policies.

This committee's last report suggested that all agencies should have written training policies. One of the most heartening aspects of the committee's inquiry during the present interim has been witnessing evidence of the adoption by department after department of written training policies.

According to testimony presented, such policies now exist in the following departments: Agriculture, Alcoholic Beverage Control, Education, Employment, Fish and Game, Division of Highways, Industrial Relations, Mental Hygiene, Natural Resources, Personnel Board, Public Health, Public Works, Savings and Loan, Social Welfare, Veterans' Affairs, Water Resources, and Youth Authority.

The committee is gratified to learn of this development.

The committee recommends that a proper subject for consideration of an appropriate Assembly committee would be an inquiry into the manner and the extent of the implementation of these training policies.

THE PERSONNEL OFFICER

Recommendation No. 9. There should be a clear statement of policy that the primary function of a personnel officer in a state department is to assist departmental management in performing its line functions and that he is not an agent of the State Personnel Board.

The number of personnel officers in state departments has increased in the last two years. What functions, if any, these personnel officers are performing which were not previously being performed by others, either in the agency or the State Personnel Board, is not clear. Neither is it clear what portion of his time the agency personnel officer devotes to assisting the department head perform his line function and what portion of his time he spends in assisting the State Personnel Board perform the functions assigned to that agency.

PERIODIC AUDIT AND INSPECTION

Recommendation No. 10. The committee recommends periodic audit and inspection of the personnel management practices of the state agencies and careful review of the audit report by the top management of State Government.

Two valuable training aids, *"Supervisor's Handbook, Sick Leave Administration"* and *"Orientation Planning Guide"* have been developed by the staff of the State Personnel Board and made available to all agencies. These illustrate the type of service this staff agency should be encouraged to provide. It is this kind of service that can readily enable an overall improvement of personnel management practices in state agencies.

It is the committee's firm belief that something further is needed. Commendable though it is that most departments are eager to undertake training and orientation programs, and commendable as it is that the staff of the State Personnel Board is technically qualified and willing to assist in a staff capacity by providing guides and giving advice, there is need for evaluation of the effectiveness of the departments' programs, for an interchange of information which will permit departments to profit from each other's experience, and a need for accountability of every department for effective personnel management.

Two years ago, the committee recommended periodic audit and inspection of the personnel management practices of the state agencies. Our report stated: "The concept of an audit is recommended not only because of the information and evidence available as to the compliance of each agency operation with the standards as developed by the State Personnel Board, but also because of the value that would result from the constructive and informative reports published following each of such audits. No agency would desire to become deficient in the operation of its personnel management program."

The evaluation is not within the scope of this committee, nor should it be the function of a legislative committee, to provide a means of the interchange of detailed information between state departments. The committee suggested in its report two years ago that the State Personnel Board be charged with the responsibility of audit and inspection. The committee believes now, as it did then, that this is a technical job and a job in which uniform standards need be applied. The State Personnel Board has a staff with the necessary qualifications to perform these functions. **The committee adds now, however, the recommendation that the staff of the State Personnel Board should perform audits and inspections at the request of, and for the consideration of, a line executive in the top management of State Government.**

PART II

LIFE INSURANCE
MEDICAL CARE INSURANCE

LIFE INSURANCE

The committee recommends that no action be taken by the Legislature at this time to share the cost of employees' group life insurance.

Employer-financed group life insurance appears from all available evidence to be the most common of all the so-called health and welfare benefits in private industry.

Almost all, 97 percent, of the office workers in private industry in the Los Angeles metropolitan area, when recently surveyed by the U. S. Bureau of Labor Statistics, had group life insurance as a condition of employment. For office workers in the San Francisco Bay area the proportion is almost as great, 95 percent. This life insurance coverage is paid for in full or in part by the employer.

Information available from the study of collective bargaining agreements likewise indicates that group life insurance is provided in the great majority of health and welfare plans.

The San Francisco Employers Council, in a recent copyrighted report,[1] indicated that among collectively bargained plans in the Bay area surveyed by that organization, 89 percent of the plans provided life insurance.

These plans, covering more than 280,000 employees, provide group life insurance benefits ranging from $300 to $5,000.

The largest number of employees are provided with $2,000 policies. The next largest number of employees, and the largest number of plans, have $1,000 amounts. The complete range of policy amounts is presented in the following table:

Amount	*Number of Plans*	*Number of Employees*
$300	1	339
500	1	200
1,000	179	73,116
1,200	3	400
1,500	10	2,980
2,000	128	104,037
2,500	47	41,602
2,750	16	6,500
3,000	4	21,306
3,500	5	3,630
4,000	3	2,024
4,250	1	500
4,500	1	480
5,000	15	17,747
Varies with earnings or sex	17	8,948
Totals	431	283,809

In the event of total disability, the great majority of plans provides for a waiver of premiums.

About two-thirds of the plans in the San Francisco Employers Council survey provide double indemnity benefits for accidental death.

[1] *Health and Welfare Plans Under Collective Bargaining San Francisco Bay Area 1957-58*, Federated Employers of San Francisco. Quoted with permission.

Since 1954 the **Federal Government** has been sharing in the cost of group life insurance for employees of the Federal Government. The government contributes half as much as the employee.

Eligible employees are automatically covered unless they specifically state in writing that they do not want the insurance.

The amount of insurance an employee carries is determined by his annual salary. It is the next upper thousand above his annual salary. For example, an employee earning $4,300 per year is insured for $5,000.

Employees 65 years of age or older, and retired employees with 15 years of service, are insured free but in reduced amounts.

After an employee is 65 the face amount of his insurance is reduced by 2 percent for each month after his 65th birthday until it is reduced to 25 percent. The remaining 25 percent stays in effect. In effect this means that soon after his 68th birthday the employee or the retired employee who has 15 or more years of service has paid-up life insurance equal to somewhat more than one-fourth his last annual salary.

Rates charged employees do not vary with age or sex. All employees pay the same rate, which is 54 cents per month per $1,000 of insurance.

Premium payments are made by payroll deductions.

The **State of California** does not follow the practice which is apparently prevailing in private industry of paying fully or partially the premiums on a group life insurance policy for each employee.

There is, under the State Employees' Retirement System, provision for a death benefit of six months' salary when an employee's death occurs while he is on the state payroll.

The committee is informed that the majority of members in the California State Employees' Association have enrolled at their own expense in that organization's group life insurance program.

The committee recognizes that the state is not in step with private industry and the Federal Government so far as group life insurance benefits for employees are concerned.

The committee recognizes that with the same amount of money, the State could buy more insurance for the employee than the employee can buy for himself after the State puts the money in his paycheck. This situation results from the fact that money spent by the State in behalf of the employees for employee benefits is not subject to income tax, whereas the same money, if paid to the employees as wages, is. Hence a given amount of State money spent by the State for employee life insurance will buy more insurance than it will if paid to the employees in their paychecks and then spent by them for insurance.

Committee hearings produced little evidence that State employees desire the State to buy group life insurance in their behalf and considerable evidence that they place a higher priority on increased wages and on medical care insurance. Therefore, the committee does not recommend any action on this matter at this time.

MEDICAL CARE INSURANCE

INTRODUCTION

Medical science, it is agreed, has made greater advances already in this century than it did in the previous 20. Today, as a result, access to medical care can literally mean the difference between life and death, between health and disease.

The benefits of medical care and modern medicines are so well recognized now that a father considers them essential for himself and his family, just as food and housing.

Society, as a whole, agrees with him.

The first of a set of guiding principles for approaching the nation's health problems agreed upon by The President's Commission on the Health Needs of the Nation in 1952 was this statement: "Access to the means for the attainment and preservation of health in a basic human right."[1] An individual standing alone, however, cannot be confident of his ability to provide his family with this necessity as he can with food and housing. In providing this necessity for their families, few are able to "stand on their own two feet."

The cost of medical care cannot be budgeted in the same way as food and housing. The onset of illness or accident is unpredictable and so is the cost. Relatively few people even in the United States can be confident of their ability to meet all the costs of needed medical care from their own financial resources. Recent research has yielded a "crude estimate" that not more than 6.6 million Americans are included in that "segment of the population which can, by its own means, through assets, savings, investments, holdings, or income, reasonably absorb the cost of medical care and hence might very well choose not to purchase insurance."[2]

By deduction then, there are over 160 million Americans who cannot absorb the cost of medical care by their own means yet whose access to medical care has been recognized as a basic human right.

Not only the people of the United States but other people throughout the Western World have been confronted with the problem.

It has been recognized that only when large numbers of individuals join together to spread the risks and share the costs, in other words, only when they employ the principle of insurance, can they be assured of access to medical care when they need it.

This recognition has led to efforts by employers, employees and others to form group prepayment medical care plans.

The State of California, to date, has not developed a group plan for its employees as many other employers have. Preliminary consideration of the subject led to the decision for this Committee to study medical care insurance plans.

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[1] *Building America's Health*. President's Commission on the Health Needs of the Nation, 1952.

[2] *Voluntary Health Insurance and Medical Care*. Five Years of Progress, 1952-1957, a monograph by J. F. Follman, Jr. Health Insurance Association of America, New York, 1958.

The committee gathered and analyzed information on employee medical care plans in Europe, in Canada, and in Australia, as well as in the United States.

It is the committee's hope that the information summarized in the following pages will contribute to the mutual benefit of both the State and the State's employees.

MEDICAL CARE PLANS FOR GOVERNMENT EMPLOYEES IN OTHER COUNTRIES

The committee wrote to other countries of the Western World to learn what kinds of medical plans these governments may have developed for their civil service employees. (A copy of the letter sent by the committee is included in Appendix A.)

Replies from ten countries are analyzed in this report. The countries studied were Australia, Belgium, Canada, Denmark, England, France, Italy, Norway, Sweden, and Switzerland.

Immediately following is a brief summary of the type of program and the method of financing it in each of these countries.

Further information on administration, forms of organization and methods of arranging and paying for medical care is summarized in Appendix B.

Types of Programs and Methods of Financing

Among the ten countries surveyed, *three reported a health insurance program specifically for their civil service employees. These were Canada, Italy and Switzerland.*

Canada. The Canadian National Government contributes no share of the premiums on the two hospital surgical-medical coverage plans available to Canadian civil servants at group rates but does underwrite the administrative cost of the indemnity type plan which is one of the two alternates. The other alternative is Blue Cross.

Canada's present program for civil servants, however, is in the process of becoming only supplemental to a new national hospitalization insurance program which, when adopted will cover all employed persons. As an employer, the government will not contribute to the new program, for employers will make no contribution toward the support of the new national program. The government will contribute, as government, to the national program as a whole.

All employed persons will participate in the hospitalization program, with the cost met one-third by the employee's premiums, one-third by the federal government and one-third by the province. Workers can cover their dependents. A worker in Ontario, for example, pays for a family of four a premium of $4.20 a month. This provides the family with "standard ward care and related hospital services."

Italy. In 1942, Italy created a governmental nonprofit organization which, "through its facilities spread all over Italy, allows almost free care to the state employees and their families." The state employees pay a small monthly contribution varying according to salary.

Each employee has a choice between two different ways of securing services. He may secure services "directly" through clinics managed by the government organization, or, if he prefers, he may secure services "indirectly." In this case he obtains care elsewhere, pays the ex-

penses himself, and then requests the government organization for reimbursement, which is made at a predetermined rate.

The employees are entitled by law to the following benefits:

1. Physician's services outside the hospital
2. Surgical services
3. Hospital care
4. Medical services while hospitalized
5. Hospital care for childbirth or conditions arising from pregnancy.
6. Medicinal expenses, etc.
7. Physical and thermal therapeutic treatments
8. Dental care
9. Prostheses

Switzerland. Such coverage as the Swiss civil servants have is supported entirely by their own premiums and carried through a semi-private company.

In two of the 10 countries surveyed, Belgium and France, public employees are included in national health insurance systems which cover all employed persons—in public as well as private employment.

Belgium. In Belgium, employers pay about one-third of the cost; employees, one-half; and the government, one-sixth.

The program of medical benefits is defined by the regulations in broad terms as "continuing medical surveillance aimed at maintaining and improving health; discovery and accurate diagnosis of all abnormal conditions to permit starting the treatment that will restore health and working capacity most rapidly, completely and economically; and necessary treatment for all pathological conditions discovered."

The insured person may pay his own bills for general medical care and the insurance organization then reimburses three-fourths or two-thirds of his payments, depending on the type of service. As an alternative, he may engage a practitioner or group of practitioners, hospital, or clinic, to furnish his entire health care for six months or a year. In that event, the practitioner or organization accepting him receives a periodic per capita payment, which may be supplemented by a small fee for service payable by the insured person.

France. France's system is financed wholly by contributions from insured workers and their employers. Dependents are covered. It is administered by the government through a system of local and regional bodies.

Benefits consist of "the refunding of medical expenses incurred in the treatment of illness, including cost of general and specialized medical treatment, hospital fees, pharmaceutical expenses, dentists' fees, etc."

The insured person bears, in principle, 20 percent of the cost himself except in the case of chronic or prolonged illness in which reimbursement is 100 percent.

When illness causes incapacity to work for more than three months or when treatment lasts six months or longer, full repayment is made "in accordance with the applicable scale."

In two other countries, Australia and Denmark, public employees are eligible, not as employees but as adult residents in the country, to form voluntary membership organizations which are encouraged, regu-

lated, and subsidized by the government and which provide a broad range of medical care to all members and their dependents.

Denmark. In Denmark about 90 percent of the population is covered through such subsidized membership organizations, usually one to a designated geographic area. Only persons in the highest income brackets are ineligible.

Australia. A similar pattern is followed in Australia except that there are no income restrictions and all persons, whether members of an organization or not, are eligible for free drugs and a daily cash hospital benefit.

In neither country do employers have a financial responsibility for the medical care costs of their employees.

In both countries the government pays out subsidies through voluntary self-governing health organizations that comply with certain minimum requirements and conditions designed to protect the members. In Australia, one of these conditions is that an organization must provide benefits for members from its own funds to cover a specified minimum range of medical services.

In three of the 10 countries surveyed, all of the population is covered by law under a national health insurance program. These three countries are England, Norway, and Sweden.

England, Norway and Sweden. Each of these three countries has very complete and comprehensive health care programs.

The National Health Service in England is the oldest and probably the best known of the three. Since 1948 it has provided a comprehensive personal health service for everyone in Britain. The Swedish parliament adopted universal health insurance in 1955, and the entire population of Norway came under a national health insurance program in July, 1956.

In all three countries, workers, employers, and the government contribute to the support of the insurance system. In Norway the health insurance program gets about 20 percent of its income from general taxes. It operates as a self-sustaining insurance company whose premiums-per-member must cover all costs. The members themselves defray about half of the cost through weekly payments; employers contribute about 30 percent of the total premium for each insured person working for them.

In Sweden too, the members pay the largest share of the cost, about 44 percent of the total; employers (including the national and local government in their role as employers) contribute 27 percent; and the national government, 29 percent.

In England about four-fifths of the cost of the National Health Service is supported by the government.

In all three countries, each person has a free choice of physicians. In both Norway and Sweden physicians are paid on a fee for service basis according to a fee schedule. The health insurance program pays three-fourths of the scheduled fee and the patient one-fourth. England uses a per capita basis for paying general practitioners.

The Swedish system provides that in cases of certain chronic and serious diseases, such as cancer, tuberculosis, diabetes and epilepsy,

needed medicines are entirely cost free. Most other medicines are reduced in price if a doctor's prescription is presented.

In Norway, the government sets retail price ceilings and limits markups allowed on drugs.

In England, everyone receiving treatment under the family doctor service is entitled to drugs, medicines and certain appliances prescribed by his doctor. The patient pays the pharmacy a charge of one shilling on each prescription form.

HEALTH INSURANCE PROGRAMS IN THE UNITED STATES

The essential characteristics of the development of health insurance in the United States have been very succinctly expressed recently in a monograph issued by the Health Insurance Association of America, an association of insurers:

> "The financing of health care is an outstanding example of a social need which American business has been striving to meet through the development of voluntary health insurance. In 1941, voluntary health insurance was comparatively unknown to the majority of American people.
>
> "There are several good reasons for the amazing growth and expansion of this form of insurance since 1941, all stemming from public interest and demand. The widespread distress of the depression years of the thirties taught us many bitterly learned lessons. Uppermost was the lesson which led us to think very practically about the ways a man could best protect himself and his family against the devastating effects of another such period in the future. And a major part of personal and family security depends on protection against the financial consequences of accident and sickness.
>
> "Employers, too, began to recognize health insurance as a necessary, in fact, a primary part of any program for developing sounder, more stable relationships with their employees. Organized labor, particularly during the wartime period of wage-freeze, turned to fringe benefits, especially health insurance, as desirable bargaining objectives.
>
> "Another contributing influence was the increasing complexity of health care, which includes oftentime expensive professional specialization, employment of new and expensive drugs and equipment, and not only the greater use but the increasing cost of hospital facilities. All such factors had the effect of directing public attention to the cost of ill health. Hospitals themselves have always been concerned with the payment of their charges and doctors, zealous to preserve the private practice of medicine, encouraged their patients to be insured."[1]

Such has been the public interest that more than 115 million persons in the United States now have an insurance policy against hospital expenses. It has been primarily through sale of coverage for groups of employees that health insurance in this Country has grown.

[1] *Voluntary Health Insurance and Medical Care, Five Years of Progress, 1952-1957*, a monograph by J. F. Follman, Jr. Health Insurance Associates of America, New York. February, 1958.

By 1953, buying group health insurance through the place of employment had become the predominant pattern of group coverage in the United States. The Health Insurance Foundation estimates in that year 59 percent of group health insurance was paid for totally or in part by the employer.

With this pattern firmly established, it spread very rapidly, until today the vast majority of employees in private industry have some type of medical care insurance as a condition of employment.

Though providing no direct subsidy to health insurance, the Federal Government has given this approach great stimulus and an indirect subsidy by exempting from taxation the employer's expenditure for health insurance premiums for his employees.

CALIFORNIA

Except in one aspect, California pretty generally follows the national pattern.

In 1945, the California Legislature passed the first state "unemployment disability insurance" law in the United States. Today it is one of only four in the Country. Its passage brought under state "disability insurance" all employees in private industry covered by the unemployment compensation law. The weekly cash sickness benefits and the daily hospitalization benefits provided under this law are financed entirely by a withholding tax upon employees. There is no employer contribution or state subsidy.

By agreement and with State approval, an employer and his employees may choose a private insurance carrier instead of the State Disability Fund.

Presently the hospital benefit for workers insured under the State Disability Fund is $12 a day for each day of hospitalization up to 20 days for each period of disability. The weekly cash disability benefit is $50 a week maximum up to as many as 26 weeks for each separate spell of disability. Unless hospitalized, an employee is not eligible to claim the weekly disability benefit for the first seven days an illness incapacitates him for working.

State employees are not covered by this law.

How Many Employees Have Some Medical Care Insurance?

In Private Industry. In California, in January, 1957, 83 percent of all employees working under union agreements had some form of medical care insurance paid for at least in part by their employer. They had this as a condition of employment under the terms of their union agreement. In at least 14 different industries, the coverage was 95 percent or higher, according to the Division of Labor Statistics and Research of the California Department of Industrial Relations, the agency which made the survey.

Surveys of wage rates and wage supplements are made each year by the United States Bureau of Labor Statistics in California's two largest metropolitan areas. From these it is apparent that unorganized as well as organized workers in private industry are usually provided with some medical care insurance by their employers.

In the Los Angeles metropolitan area, 89 percent of all the office workers surveyed in early 1958 were employed by establishments having hospitalization insurance plans for their employees.

The practice, already widespread five years ago, has been increasing. As the following tabulation indicates, the proportion of office employees in the Los Angeles-Long Beach area who work in establishments providing hospital, surgical, and medical insurance has increased:

	Percent of office workers employed in all industries surveyed[1]	
Type of benefit	*1953*	*1958*
Hospitalization insurance	78	89
Surgical insurance	77	89
Medical insurance	61	75

In the San Francisco-Oakland area the percentages are somewhat smaller, though still representing a great majority by 1958:

	Percent of office workers employed in all industries Surveyed[2]	
Type of Benefit	*1953*	*1958*
Hospitalization insurance	61%	81%
Surgical insurance	59%	81%
Medical insurance	47%	70%

In both of the above tabulations, employees were considered to be covered by an insurance plan only if at least a part of the cost is borne by the employer.

In Other Public Jurisdictions. As of June 30, 1958, the majority of California's counties were participating in the cost of a medical care policy for their employees.[3]

Likewise, a majority of the California cities surveyed by the California State Personnel Board in September, 1957, were paying full or partial cost of premiums on a medical care policy covering their employees.

California does not finance any health insurance for most State employees. Neither does the Federal Government for most federal employees.

Summary. The practice of employer participation in the cost of some medical care insurance for employees is prevailing in private industry and in California's counties and cities. State and Federal Government employees are among a small minority of wage and salary earners in California whose employers do not follow the widely prevailing practice of paying all or a part of the monthly premium on their employees' medical care insurance.

How Are Medical Care Benefits Provided?

Medical care benefits are generally sold as a series of specific benefits or categories of benefits to be made available under prescribed circumstances or conditions and within specified time limits. Complete and

[1] Occupational Wage Survey, Los Angeles-Long Beach, California, March, 1958, U. S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 1224-13, and February, 1953, Bulletin No. 1116-14.

[2] Occupational Wage Survey, San Francisco-Oakland, California, January, 1958, U. S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 1224-8.

[3] A County Employees Survey Compiled by the League of County Employee Associations.

unlimited health care through prepayment is rare in California, if indeed it exists.

Each specific benefit or category of benefits is sold on either an indemnity basis or a service basis.

When a medical care benefit is written on an *indemnity* basis, the underwriting company states in the policy the amount of money it will reimburse the insured person who incurs a charge for this particular item of medical care.

When a medical care benefit is written on a service basis the underwriter accepts liability for providing or paying for the specifically described benefit. Any charge which can be made to the insured person for that benefit is stated in policy.

With each indemnity benefit, the underwriting organization knows what its maximum liability is. The insured person does not know his.

With each service benefit, the insured person knows what his maximum liability for receiving that benefit will be. The underwriting organization usually cannot know what its maximum liability for providing it may be.

To illustrate, surgical benefits are most commonly sold on an indemnity basis, but they are sometimes provided on a service basis. When a surgeon's services are obtained on an indemnity basis, the underwriter pays the insured person the sum listed in the surgical schedule of the policy for the operation performed and the insured person pays the surgeon.

The insured cannot know what his liability may be until he determines how much the surgeon will charge him.

On the other hand, when a surgical benefit is given on a service basis, the underwriter by whatever arrangement has been worked out, pays the surgeon. If the insured can be charged for a surgeon's services he will know from reading his policy and also the amount he will pay is known to him beforehand.

Provision of a benefit on a service basis does not mean the insured person will have no charge to pay for the specific service. It means he will know beforehand whether he does and how much. From the point of view of administration, it also means that the paperwork of accounting, reimbursing, and handling a claim for each specific benefit is reduced or eliminated.

Many underwriters provide one benefit on a service basis—most frequently, the hospital room. Some provide more than one, but very few provide most of their benefits on a service basis.

Traditionally, the insurance companies have provided medical care benefits on an indemnity basis. Upon presentation of a claim for any item of medical care covered by the plan, they made cash reimbursement up to a specified maximum amount.

In recent years, however, insurance companies have departed from the indemnity approach to the extent of frequently providing hospital room benefits on a service basis.

Those medical care benefits which have been most widely provided on a service basis have been offered by organizations whose members perform the particular type of service. Hospital benefits were offered on a service basis in 1929 by Blue Cross, an organization formed and directed by hospitals. Physicians' surgical services were offered on a

service basis in the late thirties by California Physicians' Service, an organization formed and directed by physicians.

As the health insurance field expanded and there was an increasing demand for greater breadth of coverage, both of these organizations developed methods of obtaining other types of benefits for their insured. The other benefits which have been added are usually written on an indemnity basis. Sometimes their original one is on an indemnity basis too. For example, California Physicians' Service writes physicians' care on an indemnity basis for persons whose income is above a specified limit. These persons may be billed additionally by the member physician for visits which their policy provides.

Blue Cross furnished hospital care on a service basis. When Blue Cross also writes physicians' care and other benefits, these are provided on an indemnity basis, in the same way as they are provided by insurance companies. This organization maintains contractual relations with hospitals to furnish services and pays these vendors for services they render according to each vendor's established rates. For physicians' care and other benefits, the worker is reimbursed up to the stated maximum liability the organization has accepted in his plan.

California Physicians' Service provides hospital care on a service basis, paying the hospital's established rates for services rendered and making payments directly to the hospital, the same as Blue Cross. Physicians' care and diagnostic laboratory and X-ray services are provided on a service basis for a member whose income is below the C. P. S. ceiling. In this case, the worker is assured that he will incur no financial liability for any service to which he is entitled under the plan when performed by a physician who is a member of California Physicians' Service. This organization makes payments directly to the physician in accordance with a fee schedule.

For the member whose income is above the ceiling, physicians' care under C. P. S. plans is on an indemnity basis, since, in addition to the scheduled fee the physician receives from C. P. S., he may charge the patient any amount he chooses. California Physicians' Service will pay any licensed physician and surgeon for services rendered to the subscriber; however, only those physicians who have signed a contract with C. P. S. as member physicians are bound to observe the commitment of no additional charge to subscribers whose income is below C. P. S. ceiling. Some other medical care benefits are on an indemnity basis regardless of income level, for example maternity care and poliomyelitis benefits.

In view of these developments, it is possible, as has been done subsequently in this chapter, to combine and compare almost directly the benefits provided in plans written by insurance companies, with those of Blue Cross and California Physicians' Service.[1]

In a recent survey of large collectively-bargained health and welfare plans in California, insurance companies, Blue Cross and California Physicians Service had underwritten plans covering 80 percent of the workers surveyed.[2] Insurance companies covered 62 percent of the total and Blue Cross and C. P. S. the other 18 percent.

[1] Increasing competition has been cited by at least one recent analysis as the explanation for the narrowing differences. Herman M. Somers and Anne R. Somers, *"Private Health Insurance"* California Law Review, Vol. 46, pp. 512-13.

[2] *Collectively-Bargained Health and Welfare Plans, California 1957*, Division of Labor Statistics and Research, California Department of Industrial Relations, San Francisco, to be published.

Eleven percent of the workers surveyed had an individual choice between Kaiser Foundation Health Plan and an alternate plan. The alternate was usually one of the above three.

Kaiser Foundation Health Plan arranges for the provision of hospital care, physicians' care, laboratory, X-ray and other auxiliary services on a service basis. Benefits for emergency care, when a health plan member is more than 30 miles from a Kaiser facility, are on an indemnity basis. The health plan contracts with Kaiser Foundation Hospitals for hospital services and with the Permanente Medical Group (San Francisco Bay area region) and with the Southern California Permanente Medical Group (Los Angeles-Fontana region) for physicians' services. The method of payment for the vendors of services is essentially per capita.[1]

Thus the contractual relationship between Kaiser Foundation Health Plan and the vendors of the plan's services differs from that which Blue Cross and C. P. S. have with vendors of their service benefits in that the Kaiser plan prepays the vendors the equivalent of a per capita amount whereas Blue Cross and C. P. S. pay a fee for each service rendered.

Six percent of the workers surveyed by the State's Division of Labor Statistics and Research were receiving their collectively-bargained benefits through what the division describes as **employee hospital associations.** This term is used to designate an association organized specifically for the purpose of providing hospital and other medical care benefits to its members. It may have its own hospital facilities or contract with private hospitals and physicians to provide services for its members.

For example, The Key System Employees' Medical Plan provides medical care benefits in a manner similar to the Kaiser plan. By prearrangement with specified vendors it provides all medical care benefits on a service basis, with the exception of emergency medical service in areas not ordinarily served by the plan.[2]

Among those in the division's survey, 1 percent did not buy a policy or form an association as described above. Instead they provide benefits by **direct payment** instead of "indirectly" through an underwriter. This approach may be more common among non-negotiated plans than it is among those which are collectively bargained.

Among those which are collectively bargained, the scheme is usually to set up a trust fund into which employer contributions are made and from which bills are paid for medical care to eligible members. Either indemnity or service benefits can be provided by this method of direct payment. The General Mills Health Association, for example, provides benefits on an indemnity basis, reimbursing the employee for the cost of an item of medical care up to a stated maximum amount.

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[1] A member of the Kaiser Foundation Health Plan can receive services at any of the six different hospitals and 14 different outpatient centers in the San Francisco Bay area. Outside this area, services are available in the Los Angeles-Fontana region, in Portland, Oregon, and Vancouver, Washington, and in Honolulu, T. H.

[2] For further information on plans of this type see the Division of Labor Statistics and Research report on this survey cited above. Also for information regarding such plans in the United States, see Brewster, Agnes. *Independent Plans Providing Medical Care and Hospital Insurance—1957 Survey* Social Security Bulletin, April, 1958.

How Much Does the Employer Contribute?

Employers contribute to the cost of health insurance programs for their employees in various ways and amounts. Essentially, there are two common approaches in collective bargaining:

(1) Level of contributions—The employer either agrees to pay a specified money amount per employee for a given period of time or

(2) Level of benefits—The employer agrees to provide or procure for his employees certain specified benefits.

With the first approach, the employer's premium rate is fixed and the benefits it will buy may vary over the period of the contract. With the second approach, the level of benefits is fixed and their cost may vary over a period of time.

In most collectively bargained health plans in California, the first approach has been used—the employer has agreed to a specific money contribution. About two-thirds of the union workers covered by health plans in California are covered under such plans. About one-third work for employers who have contracted to provide a specified set of benefits.

The most complete data available on employers' contributions for health care plans are derived from those which are collectively bargained. The Division of Labor Statistics and Research of the California Department of Industrial Relations periodically surveys these plans throughout the State. Plans in the San Francisco Bay area are surveyed periodically by the Federated Employers of San Francisco.

In considering the figures on employer contributions to collectively bargained plans it is *important to bear in mind that they represent the cost of something more than is being considered here. They include in nearly all cases some amount of life insurance as well as medical care coverage.*

In January, 1957, the State Division of Labor Statistics and Research surveyed 775 collectively bargained contracts for 764,000 workers where the employer had agreed to pay a specified money amount for a "health and welfare" plan. Excluded were contracts obligating the employer to provide a set of benefits instead of specifying his money contribution. As the division stated in describing this survey, "The 775 agreements on which this table is based specified the total employer contribution per employee for health insurance or health and life insurance in dollars per month or in terms convertible to dollars per month (assuming a work month of 173.3 hours). These contributions sometimes also provide accidental death and dismemberment benefits or weekly disability benefits supplementing those provided by California law." (See Table, page 48.)

The average employer contribution for health and life insurance among all the contracts surveyed by the State's research organization was $12.35 for a full-time employee. In the Los Angeles-Long Beach Metropolitan area it was $12.67. In the San Francisco-Oakland Metropolitan area it was $11.82.

A survey of provisions during the 1957-58 contract year in welfare plans in the San Francisco Bay area was made by the Federated Employers Council of San Francisco and the United Employers of Oakland.

The report of findings states:

"Employer contributions for providing health and welfare benefits to employees and dependent(s) range from $2.50 to $30.49 per month, with the median payment being between $11.50 and $11.99. The most common payment is between $13.00 and $13.49 per employee per month.

Employer payments, however, are considerably less when benefit coverage is on an employee basis only. Such payments range from $4.00 to $16.49 per month, with the median and most common payment between $8.50 and $8.99." [1]

EMPLOYER CONTRIBUTIONS FOR HEALTH AND LIFE INSURANCE

775 California Union Agreements Covering 764,000 Workers—January, 1957

Employer contribution (per month)	*California*	*Los Angeles-Long Beach metropolitan area*	*San Francisco-Oakland metropolitan area*	*Remainder of State*
Less than $1	a	–	a	–
$2-$2.99	1	1	–	a
3- 3.99	a	a	a	1
4- 4.99	2	1	3	1
5- 5.99	3	2	1	4
6- 6.99	2	2	1	2
7- 7.99	2	3	2	a
8- 8.99	16	6	26	17
9- 9.99	5	2	10	4
10-10.99	16	19	13	16
11-11.99	9	12	8	8
12-12.99	6	11	2	3
13-13.99	10	13	8	10
14-14.99	2	5	a	a
15-15.99	a	a	–	1
16-16.99	1	–	3	1
17-17.99	23	20	20	32
18-18.99	–	–	–	–
19-19.99	a	a	–	a
20-20.99	a	–	a	–
21-21.99	a	a	1	a
22-22.99	–	–	–	–
23-23.99	–	–	–	–
24-24.99	–	–	–	–
25-25.99	–	–	–	–
26-26.99	2	3	2	a
Total	100	100	100	100
Average Employer Contribution	$12.35	$12.67	$11.82	$12.50

a. Less than ½ of 1 percent.
SOURCE: California Industrial Relations Reports, May, 1957
Division of Labor Statistics and Research
California Department of Industrial Relations

Do the Employees Contribute? Are Dependents Covered?

As early as 1954 it was the overwhelming practice in private industry for the employer to pay the full cost of the group insurance coverage.

[1] *Health and Welfare Plans Under Collective Bargaining, San Francisco Bay Area*, 1957-58, Federated Employers of San Francisco, p. 7 *(copyrighted)*. Please note that these amounts generally include life insurance as well as medical care.

The California Division of Labor Statistics and Research found in a survey of Northern California union plans in 1954 that the employer paid the cost of coverage for 90 percent of the employees under the plans surveyed. Furthermore the premium paid by the employer also provided benefits for the families of more than half of all workers covered by the plans reviewed.

The Federated Employers Council of San Francisco surveyed negotiated plans in the Bay area in 1955 and 1956 and found the employer paying the cost of health and welfare coverage for 96 percent of the employees covered by the survey. Furthermore, coverage for employee dependents was also paid by the employer in more than two-thirds of the plans covering three-fourths of the employees.

By June, 1957, when the California Division of Labor Statistics and Research surveyed all large union agreements throughout the State, the practice of family coverage at the employer's expense was preponderant throughout the State. As the table indicates, for almost two out of three workers covered, the employer paid the cost of coverage for the employees' dependents as well as the employees.

Financing arrangements	*Number of plans*	*Number of workers covered*	*Percent of workers covered*
Total	211	854,300	100
Employer pays full cost of benefits			
For worker and dependents	131	546,290	64
For worker; dependents covered at worker's option and expense	38	181,020	21
For worker; no provision for dependents	21	49,660	6
For dependents; worker not covered	2	3,340	[a]
Employer and worker share cost			
For worker and dependents	14	63,500	8
For worker; dependents covered at worker's option and expense	2	2,550	[a]
For worker; no provision for dependents	3	7,940	1

[a] Less than one-half of 1 percent.

Only 9 percent of the workers covered by the union contracts surveyed shared in the cost of their own coverage. About 30 percent of the workers paid part or all of the cost of covering their dependents.

The widespread practice in private industry of the employer paying the entire cost of coverage for both the employee and his family is generally explained by two facts.

1. The family is an economic unit. The employee's concern in providing against medical and hospital costs is not for himself alone, but for his entire family.

2. When an employer spends a dollar directly on behalf of his employee for a health plan it buys more than it can if he puts it in the employee's pay check first. Spent by the employer, the dollar is exempt from federal income tax. Paid to the employee, it is taxed before he receives it and what he has left to spend is less than a dollar.

If the employee pays his own premiums or shares in paying them he gets fewer benefits than if the employer pays them for him.

How Are the Plans Administered?

Among collectively bargained medical care programs in California, there is a close correlation between the form of the bargaining and the administrative set-up of the health plan.

Where many employers join together for bargaining with the union and sign a common agreement, they usually establish a health and welfare trust fund with an equal number of employer and union trustees. Usually the contract provides that each employer will pay a specified amount of money per employee into the trust fund. The joint trustees then are responsible for providing the employees with benefits financed from this "pot".

When an employer bargains singly with his own employees and in bargaining agrees to finance a medical care plan, he almost invariably asserts his management prerogative to administer the plan. The health plan is seldom jointly administered by the union and the employer. Most often, when an employer bargains singly with his own employees, he agrees to a specified set of benefits, not a specified amount of money.

Thus, *multi-employer* bargaining on medical care plans usually results in an agreement by the employers to a specific *level of contributions* to be paid to a jointly administered trust fund.

Single-employer bargaining usually results in an agreement by the employer to provide his employees with a certain specified *level of benefits*. The employer retains the administration of the plan as management's prerogative and responsibility.

An employer-financed health plan is almost never administered by the union alone since the National Labor Relations Act prohibits this practice.

A reminder here may help to maintain perspective. Much that is known about employee health plans comes from study of those which have been negotiated by collective bargaining.

Of those plans that have been collectively bargained, the joint trusteed type of administration has attracted the most attention and interest. But as is often true, the type most noted is not most frequent. The health plans of a minority of wage earners in California and in the Nation are jointly administered. A reliable estimate for California is that those under a joint trusteed type of administration represent less than 25 percent of all wage earners.[1]

Prevailing practice in the installation and administration of employer medical care plans includes unquestionably, (1) employer-selection of the set of benefits; (2) employee eligibility to coverage as a condition of employment; (3) employer administration of the benefit program.

What Benefits Are Provided?

No employee medical care plan which came to the attention of the committee and staff provides complete coverage of an employee's medical care needs. Drugs, special duty nursing, periodic physical checkups, eyeglasses, and dental care are some of the categories of medical expenses completely excluded in most plans.

[1] Helen Nelson, *Supplemental Benefits in Health Care*, Proceedings of Health and Welfare Plan Conference sponsored by the California State Federation of Labor and University of California, July, 1957.

Most plans furnish some hospital, surgical, and inhospital medical care benefits for both the worker and his dependents.

Other categories of medical care often provided, within various limits and under certain circumstances, are physicians home and office visits, outpatient laboratory and X-ray, and maternity care.

The benefits most commonly provided are available to the employee when hospitalized. The value of the benefits ranges widely, reflecting differences in the amount of money spent to buy the coverage and the choices among the available items for purchase.

"Insurance Companies, C. P. S. and Blue Cross—Basic Plans"

At the committee's request, the Division of Labor Statistics and Research of the California Department of Industrial Relations summarized the most common benefits in a group of large plans written by insurance companies, C. P. S. and Blue Cross. Reviewed were 180 large "basic medical" benefits plans. Together these 180 plans cover almost 700,000 California workers.

The summary is presented here partly to give some indication of the relative frequency with which various types of benefits are provided for some employees in private industry, and also to demonstrate the wide range in value that the same specifically named benefit can have.

SUMMARY OF BENEFITS PROVIDED IN 180 BASIC MEDICAL BENEFIT PLANS PROVIDING MOST OR ALL BENEFITS ON AN INDEMNITY BASIS

I. Hospital Benefits

A. *Daily Room Allowance.* Slightly more than half of the employees were covered by a fixed cash daily allowance. Allowances ranged from $5 to $20 per day. The mean was $12.70. Another 40 percent were entitled to wardroom accommodations. Less than 5 percent of the workers were provided semiprivate accommodations.

B. *Duration of Hospital Stay.* Benefits ranged from 30 days to 120 days. Most common allowances were 70 days (over half had this), 100 days, and 31 days.

C. *Hospital Services Other Than Room and Board.* Benefits for these services were provided in several different ways:

1. By Cash Reimbursement to a Fixed Amount. About one-third of the employees were provided reimbursement to a fixed amount ranging from $240 to $1,500. An additional 17 percent were provided unlimited benefits for covered services.
2. By Cash Reimbursement to a Fixed Amount Plus Additional Reimbursement on a Percentage Basis. Around one-fifth of the employees were provided with this type of reimbursement, ranging from $240 plus 75 percent of the next $500 to $400 plus 75 percent of the entire excess.
3. On a Service Basis. About one-fifth of the workers were provided with other hospital benefits on a service basis, wherein all covered services were provided, usually at no extra cost to the member.

D. *Ambulance Service.* Ambulance service benefits were provided to almost half of the workers in amounts ranging from $10 to $50 on a per disability basis or $10 to $25 on a per trip basis. Approximately one-fourth were provided with ambulance service benefits as a part of their other hospital services with no limit specified.

E. *Renewal of Hospital Benefits.*

1. Unrelated Causes. For unrelated conditions, hospital benefits were renewed immediately for nearly half of the workers. For the balance of the workers, benefits were renewed either after complete recovery or from 30 to 90 days after hospital discharge.
2. Related Causes. For related causes, hospital benefits were renewed upon return to work for two out of five of the workers. Other plans specified combinations such as complete recovery or 90 days after hospital discharge. In a small percentage of plans hospital benefits were not renewed for related conditions.

II. **Surgical Benefits.** All but two of the 180 basic plans, provided for surgical care benefits. The remaining two plans provided for surgical benefits in supplemental major medical plans.

A. *Surgical Benefit Schedules.* Surgical benefit schedules were provided in practically all plans (except the two supplemental plans) and specified a series of money amounts to be paid for various surgical procedures. These schedules were classified according to the amount payable for the most expensive operation in the schedule. The range was from $50 to $565. One plan provided full surgical coverage by a clinic, and seven C. P. S. plans provided full surgical coverage if the worker's income was below the ceiling specified by the plan.

B. *Renewal of Surgical Benefits.*

1. Unrelated Causes. For over three-fourths of the workers surgical benefits were renewed immediately or upon return to work when the subsequent surgery was *unrelated* to the initial surgery. For almost one-fifth the renewal conditions were not specified. The balance of workers were entitled to renewal of surgical benefits after a specified length of time, usually three months.
2. Related Causes. When the subsequent surgery was *related* to the initial surgery, for one-third of the employees benefits were renewed immediately or upon return to work. For 45 percent benefits were renewed after a waiting period varying in length from two weeks to six months. For 4 percent benefits were not renewed, and for 17 percent the renewal conditions were not specified.

III. **Physician's Services Other Than Surgical.** Under the basic plans, all but 14 percent of the workers were entitled under some circumstances to physician's care for other than surgery.

A. *Inhospital Physicians' Services.* Plans covering almost 85 percent of the employees provided inhospital medical benefits.

Practically all of these fixed cash allowances to be paid for doctors' visits. These allowances varied from $3 to $6 per visit, but for the great majority of workers, the amount was either $3 or $4. Three percent were provided with this benefit on a service basis (1 percent without income restrictions and 2 percent under C. P. S. plans with income restrictions). Typically, the maximum limitation on this allowance was the duration of stay in the hospital, with the additional limitation that the worker could be reimbursed for only one visit per day.

B. *Physicians' Office and Home Visits.* Over 500,000 workers (75 percent) in 148 plans were covered by physicians' home and office visit benefits. The cash allowance for office visits ranged from $2 to $5 per visit, with $3 and $4 being the most frequently specified amounts. Four plans, covering about 2 percent of the workers, provided unlimited necessary medical services at no charge at a clinic or union health center. C. P. S. plans provided coverage for office visits at no charge to another 2 percent when the workers' incomes were within the limitations set by the plans.

For home visits, the range of cash allowances was from $3 to $6 with the most frequent amounts being $5 and $6. Home visits without charge were provided to 1 percent of the workers (without income restrictions) and to another 2 percent covered by C. P. S. plans (with income limitations).

When plans combined *hospital, office and home visits* in the same limitation, these limitations varied from $225 to $300 per disability and from $150 each 12 months to $300 each six months. Three of the 180 plans provided for unlimited physicians' visits if the worker were not totally disabled but set a limit at 52 weeks in case of total disability.

For those plans combining *office and home visits* in the same limitation, the limitations ranged from $250 each 12 months to $300 each six months. Ten plans, covering less than 5 percent of the workers, provided for unlimited physicians' visits if the worker were not totally disabled, but limited benefits to 52 weeks in case of total disability.

IV. Outpatient Diagnostic Laboratory and X-ray Benefits. Plans covering more than 90 percent of the employees provided outpatient diagnostic laboratory and X-ray benefits. For the great majority, the benefits were provided by cash reimbursement and ranged from $25 to $100, with the most common allowance being $50. For the great majority of workers (75 percent), benefits were renewed for each separate accidental injury and at least every 12 months for illness. Eight plans, covering less than 3 percent of the workers, provided unlimited laboratory and X-ray benefits.

V. Maternity Benefits.

A. *Maternity Hospitalization.* One hundred plans, covering about 40 percent of the workers, provided a fixed maximum hospitalization allowance for maternity care. Ranging from $50 to $220, the most common allowance was $100.

B. *Physician's Fees for Normal Delivery.* Among 104 plans, covering close to half of the employees, which provided a fixed allowance for physician's fee for normal delivery, the amounts ranged from $50 to $105. The most common allowance was $75.

C. *Maternity Hospitalization and Physician's Fee for Normal Delivery Combined.* Plans covering about one-third of the employees combined the hospitalization and delivery fee and set a total for both. This limit ranged from $25 to $250. The most common amount was $150.

D. *Physician's or Surgeon's Fee for Complications of Pregnancy.* For complications of pregnancy involving surgical procedures other than for normal delivery, scheduled allowances were usually specified in the surgical schedule of the specified complications. The three most frequently mentioned complications and the allowances provided for them were: Caesarian section—$150; operations for extrauterine pregnancy—$150; and miscarriage—$37.50.

VI. Other Medical Care Benefits.

A. *Supplemental Accident Benefits.* Supplemental accident benefits were provided for 86 percent of the workers. This was provided in the form of a maximum cash allowance and in every instance was $300.

B. *Poliomyelitis Benefits.* Poliomyelitis benefits were provided for 74 percent of the workers. Maximum benefits ranged from $1,500 to $5,000. The most common was $5,000, which was provided for almost half of all the workers.

C. *Malignancy Treatment Benefits.* Benefits for treatment of malignant conditions were provided for about 1 percent of the workers. The least was $83.50 and the most, $1,000.

D. *X-ray and Radiation Therapy.* Special X-ray and radiation therapy benefits were provided in 15 plans covering about 15 percent of the workers. Payments were usually specified at $7.50 per treatment up to maximum amounts ranging from $150 to $300.

The types of benefits listed above account for all the kinds of benefits provided in the great majority of indemnity-type basic plans. In a few plans there are, no doubt, uncommon types of benefits not detailed in the above summary.

However, the above summary does make clear that the basic indemnity-type health insurance plan is a parcel of separate bits and pieces.

Major Medical Expense Insurance

As more money has been pledged to buy greater benefits, the insurance industry has brought forth "major medical" policies. Most often, with employee groups, major medical is sold in addition to and separate from the basic plan of the type summarized above.

The approach is similar to that used in the basic plan in that:

1. It is an indemnity plan as is the basic plan; that is, it reimburses the employee in cash when he submits satisfactory evidence that he has incurred medical care expenditures underwritten by the plan.
2. It sets a maximum limit on the reimbursement.

It differs in its approach in that:

1. It combines many types of medical care under one dollar limit.
2. It is intentionally designed never to reimburse the insured person fully.

When major medical is sold in addition to a basic plan, it is constructed so that usually the insured person first uses his maximum benefit under the basic plan, then pays some specified additional amount himself before he becomes eligible for reimbursement under his major medical policy. Then, subject to a final limit, he is eligible to be reimbursed by a certain percentage, less than 100, for all of his additional expenditures for any of the medical care items covered by his major medical policy.

Major medical thus requires the insured to assume the full cost of some of his health care, and thereafter it reimburses him for most but never all of the cost of a wide range of health services up to a large maximum amount.

Its cost varies according to the length of the "corridor" between the basic plan and the major medical. At one end of this "corridor" his "basic medical" leaves off; at the other his major medical begins. The corridor is there by design and while the insured is within it he pays his own costs fully. The premium for major medical also varies according to how near or far from 100 percent reimbursement is when he again becomes eligible for it. In brief, the cost varies according to the size of the deductibles.

Except for accidents affecting more than one family member, the deductible amount is usually applied separately to each individual in the family, and the head of the family may have to pay several times the stated deductible before receiving much reimbursement from his major medical policy.[1]

Once eligibility for major medical reimbursement is attained, the number of separate claims an employee may submit for processing and payment usually is unlimited until their total reaches the maximum dollar limit.

One reservation many have expressed about the major medical approach to greater coverage of medical care needs is that it has no controls to deter increases in charges for health services and, indeed, may encourage inflation in the cost of health care. The insured, it was hoped, would be encouraged by the deductible feature to be concerned with keeping the cost down. The insured, by himself, may not be in a position to do this, and experience is beginning to indicate that he has less incentive to try than was hoped.[2]

[1] For a report on the possible effect of major medical coverage on the medical care expenditures of 340 families, see Agnes W. Brewster and Simon Dinitz, "Health Insurance Protection and Medical Care Expenditures," *Social Security Bulletin*, November, 1956.

[2] See Jerome Pollack, "*Major Medical Expense Insurance: An Evaluation*," *American Journal of Public Health*, Vol. 47, No. 3, 1957, pp. 322-334.

Direct Service Plans

There is little question that the direct service plans provide a broader range of health care services than the conventional "basic medical" indemnity-type plans. The form of the organization, however, limits the member's choice of physicians and facilities.

Centered, as a rule, around a single or a few hospitals and carried on by a group of physicians, the direct service plan represents an endeavor toward the more effective organization of medical care services which prepayment by large numbers of persons makes possible.

To the extent the direct service plan can achieve more effective organization of medical care services and better control over the cost of providing these services, to that extent it can provide more health care for the premium dollar than the indemnity-type plan.

There is considerable evidence that the direct service plans where they exist are doing this.

For example, the direct service plans more often provide health care for dependents. In a survey of labor-management negotiated health plans in Northern California in 1954, the State Division of Labor Statistics and Research found that those few plans providing physicians' home and office visits on a direct service basis accounted for half of all the employees surveyed who had any insurance for physicians care for their dependents outside the hospital.

Some evidence suggests they may find it less difficult to cover retired employees. In a later survey of large labor-management plans throughout the State, this same state agency found that of 850,000 workers surveyed, plans covering 64,000 workers included some benefits for retired workers. Most of these were employee hospital association plans. Of the 64,000 workers covered by plans providing for the continuation of some benefits after retirement, 47,000 were members of employee hospital associations.

A MEDICAL CARE PLAN FOR STATE EMPLOYEES

As described in earlier sections of this report, the end of World War II saw a tremendous demand on the part of peoples throughout the Western World for access to the benefits available from modern medical care. In some nations, the decision was to use the mechanism of government in one way or another to provide or promote access to these benefits. This approach was considered in this country and rejected. It was rejected at the national level and also at the state level. In 1946, the Governor of California, Earl Warren, proposed a single group insurance plan for all employees in California to be financed by both employees and their employers, using the mechanism of State Government. The people and their Legislature rejected his proposal. Apparently they preferred a different approach.

Employers and their employees have for more than 10 years been working toward a solution of the problem of regularizing the payments for and spreading the unpredictable costs of medical care. Usually the employees ask their employer to make a payment on their behalf each payday to maintain a group health insurance policy for themselves and their families.

The health insurance policy bought is generally chosen from among those put on the market by private insurance companies, though a significant share of the market has been captured by plans owned and operated by the vendors of medical care services.

Now the California Legislature again has before it the consideration of medical care insurance. This time, as an employer requested by the employees to finance a medical care program for them.

The State's employees are one of the few remaining large employee groups who do not have an employer-financed medical care program.

There are two small select groups of state employees who are exceptions to this general fact. "Health and welfare" benefits were extended to two groups of state employees by the 1957 Legislature. One group is comprised of approximately 215 building trades union members employed on a per diem basis. The other group is comprised of approximately 550 printing trades employees. For these two groups, the State pays the full cost of hospital, surgical and medical insurance benefits for both the employees and their dependents. For the printing trades group this amount is $12 per month. Rates of contributions for construction workers are generally higher than this amount. In both cases, the State conforms to the practice in private industry and pays the amount that has been agreed upon by labor-management negotiations in the industry in the area.

More than 80,000 other state employees have no payment made in their behalf by the State for medical care benefits.

This committee has, during the interim, held hearings and conducted staff studies of this matter. In addition to the written information the committee assembled and studied and has summarized in the preceding chapters, technical and professional experts in the field of medical care benefit programs have been consulted, and administrators of large plans in private industry have been interviewed. On the basis of thorough study the committee makes the following recommendations and observations.

The committee recommends that the State establish and administer a medical care program for the employees of the State.

The committee took note of the fact that most state employees presently have some group medical care insurance. Most commonly they gain eligibility to buy group insurance from being members of the California State Employees Association and they maintain the premiums by authorizing deductions from their paychecks.

One proposal made to the committee was that the Legislature authorize and direct regular payments to this employee association for each member of the association insured under that organization's group insurance program. It was further proposed that nonmembers of the association could participate upon payment to the association of a charge for administration.

The committee does not recommend the adoption of this proposal. It does not meet several of the criteria the committee considers a plan ought to meet to be financed with public moneys.

In this report, instead of dealing negatively with the shortcomings of that proposal, it is planned to set forth certain principles the committee believes should be recognized and certain standards the commit-

tee believes should be incorporated in a state-financed medical care insurance program for the State's employees.

STANDARDS FOR A MEDICAL CARE PLAN

It is a truism that the purpose to be achieved determines the approach to be taken. To settle upon the best approach to a new undertaking, then, there needs first to be some consideration of its purpose. Truism though this is, it is often forgotten or ignored. To ignore it in weighing the possible ways of establishing an employee medical care plan is more likely to foster vocabulary development than good planning.

Not only is it important to consider purpose before approach, but it is necessary to face the fact that there may be many and differing objectives in the minds of the several parties involved and some of them may be conflicting. Certainly, some will be more important to the State than others.

It is as employers that the people of the State are confronted with defining the objectives to guide the establishment of a medical care plan for state employees.

As employers, the people of the State of California have provided their employees with a very generous sick leave plan, which continues their wages during illness, subject, of course, to well-defined limitations. There is no evidence that use of sick leave by state employees is excessive in comparison with private industry—but the State's bill for wages paid to employees on sick leave is a large figure.

There is every reason to expect that a medical care program should contribute to the health and well being of state employees. To the extent that a medical care program protects and improves the health of employees it will promote their efficiency and reduce unproductive and costly absences from the job. To that extent it is an investment and not a cost to the employer.

The committee recommends that primary among the purposes the State should seek to accomplish by the establishment of a medical care insurance plan for state employees is the protection and improvement of the health of employees and their families through access to medical care.

Proposals, plans, alternatives—all, now and in the future—should, be designed, adopted, discarded or altered, depending on their accordance with this primary objective.

To accomplish this purpose most fully the program should be designed to provide access to medical care in ways which will yield the greatest amount of benefit to the employees for the dollar spent.

Another purpose every employer has in establishing a medical care plan for his employees, the State has also—to increase the rewards of state employment and to enable the State to compete in the labor market and attract and retain able employees.

To accomplish this purpose the program should be designed to meet the needs of employees. *Hence, avenues through which employees can advise the State of their needs and desires should be established and maintained and a representative of management be clearly designated*

as responsible for receiving, considering and acting upon the employees' expressions of needs and desires.

It is from the point of view of an employer that the above statements of purpose are made.

Yet, in considering a health care plan for the state's employees it need always be with the realization that it is the State Government which is acting, it is public moneys which will be expended, and it is public policy which will be written. Whatever program is enacted will, immediately upon its creation, be the largest single plan in the State, covering more employees than any now existing employer-financed plan in California.

Because state moneys will be spent, administration of the program is the state's responsibility. Usually in planning a medical care benefit program there is much discussion about the necessity of maintaining the employees' interest in keeping the costs down and guarding against abuses of the benefit program. Less frequently noted, but equally important, is the desirability that *the State* have an interest and an incentive in keeping the costs down and getting the maximum medical care benefits for the money. State moneys will be involved and should be spent with no less scrutiny and concern on this program than on any other.

The State Government has a responsibility to the state's political subdivisions and to the state's taxpayers generally who pay taxes to local government, as well as to the State. *The committee strongly recommends that the State recognize a responsibility to the many small political subdivisions of the State and establish the plan at the outset in such a way as to permit subdivisions of the State as well as other local public jurisdictions to enroll their employees in a manner similar to that now commonly practiced in the State Employees Retirement System.*

That a saving would result to the taxpayer of the small public jurisdiction and a greater stability of benefits would be achieved for their employees is thoroughly documented in a communication regarding pooling of health insurance programs, submitted to the committee by Ted Ellsworth, Chairman, Health Plan Consultants Committee, Los Angeles. So serious is the problem of the small employee group that with the author's permission we include his communication in this report as Appendix C and recommend its careful reading.

There are several principles the committee believes should be given recognition in the establishment of a plan. The committee, therefore, further recommends:

A. **The basic principle of insurance should be honored.** A group plan is strengthened as the number participating in it increases: the risk is spread over more persons. It is weakened as the number lessens. To divide a large group into many small ones is to weaken all. To combine many small groups into one large and spread the risks over all is to strengthen all.

B. **Where possible, employee choice of basically different methods of providing medical care services should be provided.** This recommendation goes contrary to the one above and makes necessary that the two be balanced off carefully. To gain the advantages of insur-

ance, choices should be limited to a minimum of fundamentally different choices of medical care services.

C. **When one company or organization is to be selected from among several offering similar coverage, competitive bidding should determine the one selected.**

D. **An employee's right to enroll should be a condition of his employment, just as is his right to vacation credits, sick leave and membership in the retirement system.**

He should not be required to pay a membership fee in an organization or a fee for the privilege of enrolling.

E. **The program should be designed to allow the highest possible share of the money spent to go for medical care and the least possible for claims form filing and processing.**

F. **To the extent that claims forms are necessary to the administration of an employee's rights to medical care or medical care benefits, these should be administered by the departmental personnel offices in a manner similar to those for other employees benefits.**

G. **No need form nor means test should be permitted to determine the level of benefits an employee can receive.** The right to medical care benefits, obtained as a condition of employment, should vary no more in accordance with an employee's income than should his vacation right. No distinction between benefit rights on account of income should be sanctioned.

H. **Any employee's health care program should take into consideration the needs of the total family.** The employee's concern in providing against medical and hospital costs is not for himself alone, but for his entire family. Furthermore, if they are excluded from coverage under the plan, his dependents, unless they are also employed, are likely to be bereft of any coverage.

I. **The importance of the problem of medical and hospital care after retirement should receive the most careful consideration.** Adequate medical and hospital coverage for retired employees is one of the most important and difficult problems in the entire hospital and medical care field, because reduction in income and in the ability to pay coincide with increasing age and consequent increase in the probable need for hospitalization and medical care services. The problem is compounded by the difficulty of anticipating and reserving for inflationary factors which have been very pronounced in the medical care field.

Continuity of coverage for retired employees is, as a result, quite difficult to arrange and finance.

Two possible approaches within the framework of the State Civil Service system have been suggested:

a. Total costs for the entire group of state employees, including retired employees, might be distributed over the entire group.

b. Continuity of medical and hospital coverage could be provided as an additional feature of the existing retirement program

for state employees, so that during his working years each employee would generate resources to finance a medical and hospital supplement to his retirement program.

J. Continuity of coverage should be maintained when serious illness or injury of an employee may involve a prolonged but not permanent period of disability.

K. There should be an adequate appeals procedure as a check against the arbitrary or unjust denial of benefits. The individual should be afforded a fair hearing and a sufficient opportunity to obtain redress where he feels his right to benefits has been improperly rejected or inadequately met.

L. Any state-sponsored medical care program for state employees should include provision for evaluating the quality of medical care which is being bought and the extent to which the types of benefits bought meet the employees' health care needs.

M. Since many state employees are carrying health insurance plans now at their own expense, care should be taken to avoid interruption of coverage during the initial establishment of a state-sponsored program. The committee does not believe the automatic blanketing in of existing plans with sizeable membership by a "grandfather clause" is necessary or advisable.

N. Consideration should be given to the suggestion that any medical care insurance program for the employees of the State should contain a "deductible" provision to the end that the cost of the first and possibly the second office or home call of a doctor for medical service incurred for illness as distinguished from accidents shall be borne by the employee rather than by the medical health insurance program.

The State as one of the last large employers to turn attention to an employee medical care plan is in a position to benefit from the experience of others. The above stated recommendations derive from the committee's study of that experience.

It is also from study of the experience of others that the committee makes the following observations:

Although the State enters late into the field of employee health plans, the path left by those who entered earlier is not smooth, but contains many pitfalls. Some of these pitfalls are now so large as to be visible upon approaching and can be avoided by any who will travel with the light and choose their way with care. Others are neither easy to recognize nor avoid.

A certain amount of discouragment, if not disillusion, is becoming evident among some of those who have had the longest experience with employee health benefit plans. For example, rising premium costs are a source of increasing concern to employers, limited benefits distress employees; working wives have duplicate coverage in many cases; physicians complain of time spent filling out forms instead of practicing medicine; insurance companies report high loss ratios; and indexes of medical care costs continue to rise.

Nevertheless, it is unrealistic for the State to "sit it out" a while longer in the expectation that a more generally satisfying pattern of medical care coverage will present itself in the near future. That will come, more likely, by gradual development through improvements in present approaches.

Granted that any program initiated will leave a good deal to be desired, the committee believes that if the State exercises its responsibility and faces the probable difficulties that are visibly apparent, many pitfalls can be avoided.

Not only does the State have the advantage of learning from the experience of others, but the State in approaching this undertaking will also have certain natural advantages.

The State has, by virtue of the very numbers involved, an advantage in negotiating health care coverage for state employees. We should be able to secure for state employees more complete coverage than generally prevails.

The State has much experience in large scale buying by bid and negotiation.

The State has much experience in procuring services at standardized rates. For example, the Board of Control rules on hotel rates allowed as reimbursable expenses of state employees on travel status are evidence of one procedure the State has employed successfully for many years that suggests some adaptation may be applicable to a state-sponsored medical care plan.

From these observations, the committee makes these few final recommendations on procedures for designing a state-sponsored plan:

Instead of choosing among plans available on the general market, the State should design a program, develop specifications as it does for other major purchases, and then invite proposals.

The program should be clear and simple. When necessary to make this choice, the choice should be to give all of some benefits rather than a little of all benefits. Thus employees can know what coverage they do actually have and administrative complexities and costs are minimized.

Finally, the program should be so devised as to foster the provision of medical care coverage in the simplest and most direct manner possible and should be so organized as to derive the most medical care with each premium dollar.

APPENDIX A

AUGUST 19, 1958

Ministere de la Sante Publique et de
la Famille
Place Royal 2
Bruxelles, Belgique

DEAR SIR: Due to the tremendous growth of the great State of California, our present population has exceeded 14 million. To provide the necessary governmental service to its 85,000 State employees, the policy of the State is to provide benefits to its employees comparable to prevailing practices in private industry.

With a view toward including the results of the research in recommendations to the next Legislature, our Assembly Interim Committee on Civil Service and State Personnel is conducting a study to gather facts relating to a program to extend health and welfare benefits to employees of the State of California.

We are very much interested in the health and welfare program of your great country and in consulting your laws on this subject and also on medical care coverage and life insurance. We would like to receive information regarding the characteristics of your health and welfare plan. A brief evaluation of your program and any suggestions you would make which may be helpful to our committee in considering health and welfare benefits for employees of the State of California will be useful to our inquiry.

Our committee desires to obtain as much of the available information relating to the program of your great country as will be convenient for you to supply. We will be grateful for any assistance you can give us. Please let us know if there is any charge for this service.

Thanking you in advance, and with kindest regards, I am,

Sincerely yours,
SAMUEL R. GEDDES

APPENDIX B

From the committee's correspondence with various foreign countries, much valuable information on health insurance programs was obtained.

Presented here for those who are especially interested is further information on administrative procedures, forms of organization, methods of providing medical care and other features of particular interest in Australia, Belgium, Canada, Denmark, France, Norway and Sweden.

From the voluminous legal and descriptive materials received about each country's approach, the aim has been to seek out and present only the essential characteristics. The correspondence conducted and the publications obtained and reviewed during the course of the committee's research are available in the offices of the chairman of the committee.

The historical development of most of these plans differs markedly from that of those in this Country. In most European countries, voluntary membership societies organized for the primary purpose of providing sickness benefits existed centuries ago.

AUSTRALIA

The reply from Australia to the committee's inquiry began:

> "The only specific welfare provisions which the Commonwealth Service makes for its employees are in the field of pensions on retirement. Such pensions are determined under the Superannuation Act, and are administered by the Superannuation Board.
>
> "Commonwealth employees are, of course, entitled to share in the national health scheme, and enjoy the same benefits as other Australian citizens. No special provisions, however, are made for them."

The Commonwealth Government of Australia planned the National Health Service as a broad and comprehensive health program and has installed it in stages. Devised to help take care of the health of everyone in Australia, "it now provides free drugs and extensive assistance to anyone who needs medical or surgical treatment or who has to go to a hospital."

In establishing the hospital benefits scheme and the Medical Benefit Scheme, Australia like Denmark, retained and built upon voluntary membership organizations. The purpose of the government scheme was declared to be "to encourage voluntary insurance, thus spreading the risk of the individual cost of sickness over the whole community."

Any person who ordinarily lives in Australia and who is occupying a bed in a hospital is eligible for the "ordinary hospital benefit" provided by the Commonwealth. This benefit is a stated money amount per day paid to the hospital and deducted from the patient's hospital bill. Membership in a voluntary society is not necessary to receive this "ordinary hospital benefit" but for all patients in approved hospitals who are also members or dependents of members of registered hospital insurance organizations, the Commonwealth supplements the ordinary benefit by an additional benefit half as large as the ordinary.

There are about 150 registered hospital insurance organizations in Australia. To qualify for registration an organization must provide daily hospital benefits from its own funds of at least three-fourths the amount of the Commonwealth's ordinary benefit.

The medical benefit scheme was added in 1953. It is similar in approach in that it is established so as to encourage membership in voluntary health organizations.

The government pays out subsidies through voluntary health organizations that comply with certain minimum requirements and conditions designed to protect the members. One of these conditions is that an organization must provide benefits for members from its own funds to cover a specified minimum range of medical services. This minimum schedule contains a comprehensive list of services which organizations must provide to the full extent to qualify for the government subsidy. The Government's aim is that its subsidy plus the payment from the organization should cover the major portion of the doctor's charge. The organizations are free to provide their members with additional insurance for specialized medical services such as plastic surgery.

It is not necessary to be a member of any organization to qualify for Australia's pharmaceutical benefits. The service is "absolutely free to

any one ordinarily resident in Australia," when prescribed by a qualified medical practitioner. Any of a "comprehensive range of proven lifesaving and disease-preventing drugs which are accepted for the treatment of almost every serious illness" can be obtained without cost to the patient. When a doctor prescribes any drug or preparation listed in the government-approved table of drugs, he makes out his prescription in duplicate. The patient presents both copies to his chemist, who in turn presents one to the commonwealth for payment.

The program of free drugs for all citizens has been in effect since 1950.

BELGIUM

The compulsory health insurance system of Belgium became effective in 1945. It is financed by contributions determined as a percentage of wages to which the National Government adds a subsidy.

The insured person pays his own bills for general medical care, and the insurance organization then reimburses three-fourths or two-thirds of his payments, depending on the type of call. As an alternative, he may engage a practitioner or group of practitioners, hospital, or clinic, to furnish his entire health care for six months or a year. In that event, the practitioner or organization accepting him for such care receives a periodic per capita payment, which may be supplemented by a small fee for service payable by the insured person.

The fee schedules, first adopted in 1946, was designed to permit fees for services to vary with changes in the average hourly earnings of skilled and unskilled workers. A unit number is assigned to each medical service, representing the factor by which the average hourly wage is to be multiplied to derive the actual fee.

Belgium defines the medical benefits as "continuing medical surveillance aimed at maintaining and improving health; discovery and accurate diagnosis of all abnormal conditions to permit starting the treatment that will restore health and working capacity most rapidly, completely, and economically; and necessary treatment for all pathological conditions discovered." The participating practitioners, persons eligible for care, and insurance organizations are expected to collaborate toward achieving these goals. No limit is set on duration of care, and no waiting period is required.

CANADA

The response which came from Ottawa to the committee's inquiry was in terms more familiar than those from most of the other countries. It began, "You inquire about health and welfare benefits in the Public Service of Canada. The types of benefits in which you might be interested may include the following:

"(1) Hospital and medical-surgical insurance;
"(2) Sick leave;
"(3) Workmen's compensation;
"(4) Employee health services;
"(5) Group life insurance;
"(6) Superannuation."

"All Federal Government employees are also eligible for benefits under such national measures as old age assistance, unemployment in-

surance, and family allowances, as well as any others provided by the provinces in which they live."

Under the heading of hospital and medical-surgical insurance the reply stated, "These benefits are in a state of transition at present due to the introduction of a national hospital insurance plan. The plan will be administered by the provinces with financial assistance from the Federal Government and will provide standard ward care and related hospital services. Not all the provinces have as yet decided to set up a plan of this kind, but in those which have done so, *participation is compulsory for all employed persons,* and the premiums are low since the province and the Federal Government each contribute one-third of the cost (e.g. in Ontario a family of four is covered for $4.20 per month). Existing private hospital insurance plans will provide only supplementary coverage (e.g. for semiprivate accommodation). Employees of the Federal Government have two plans at their disposal—Blue Cross or the National Joint Council plan. The former is a purely private organization, whereas the latter is sponsored by the joint public service employer-employee consultative body. Employees benefit by group rates in both plans, but the government, as employer, contributes no share of the premiums. It does, however, underwrite the administrative cost of the National Joint Council Plan. Both plans will continue to provide "inhospital" surgical-medical coverage at the option of the participant, and employees may take either plan, or both. The cost and coverage is about the same in each case. Another service available is "Physicians Services Incorporated" which provides coverage for both "inhospital-medical and surgical treatment, and for doctors calls at the office or at home. Premiums for all plans may be deducted from salary at the source."

DENMARK

For over 60 years the Danish government has granted subsidies to voluntary sickness funds which met established standards and the health insurance coverage in their national program retains some of the aspects of voluntary health insurance.

Local sickness funds, usually only one to a designated geographic area, are the local self-governing units for administering health insurance. Some funds are limited to certain occupational groups, but most are open to all residents of the area, and no one may belong to more than one fund. For government approval a fund must have at least 200 members; if the membership falls below that minimum, it must combine with another fund. Active members of these funds elect their own officers and advisory committees and control the administration of medical and cash benefits, subject to the supervision of the National Directorate.

Active or passive membership in an approved subsidized local sickness fund or in one of the few nonsubsidized benefit societies is compulsory for all adults under 60 who are potentially able to make some contribution to self support. Fines, as well as loss of the right to vote, can be the penalty of failure to maintain membership.

Persons with active status in subsidized funds must transfer to passive membership when their property and income exceed specified limits.

For paying general practitioners under the health insurance system they use a per capita basis, though fees for service are a common alternative.

FRANCE

France's compulsory health insurance plan became effective in 1945 and now applies with few exceptions to all employed persons and their dependents, students, war disabled, war widows and orphans. About 60 percent of the French population is covered.

The insurance system is based wholly on contributions from insured individuals and their employers. It is administered by the government through a system of local and regional bodies called Social Security Funds. The local funds, set upon a provincial basis, are governed by administrative councils on which two-thirds of the seats must be held by representatives of insured persons. The remaining third must represent employers, family associations, and professional social security experts. Two doctors are attached to primary fund councils in an advisory capacity.

Regional funds are managed by councils composed of representatives of the primary funds in the region. They are responsible for equilizing and reinsuring the risks covered by the primary funds in their area, organizing and directing medical care control, and administering invalidity pensions.

Medical supervision of the work of primary funds is carried out by special medical advisers under a regional medical adviser appointed by each regional fund.

Private mutual benefit societies are free to provide voluntary insurance and benefits supplementing those of the compulsory system.

Insurance patients have free choice of physicians. Doctors who work under social insurance are paid on a fee-for-service basis according to fee schedules set by agreement between insurance funds and local medical societies and approved by a special national commission composed of representatives of the funds, medical practicioners, and the ministries concerned. If agreement on fee schedules cannot be reached locally, this commission fixes the rates. Usually the insurance doctor is paid directly by the patient, and the latter is then reimbursed by the fund in terms of the established fee schedule. The benefits provided include cash sickness benefits for the insured (the employed person) and "benefits in kind" for the insured person and his dependents.

The "benefits in kind" consist of "the refunding of medical expenses incurred in the treatment of illness, including cost of general and specialized medical treatment, hospital fees, pharmaceutical expenses, dentists' fees, etc."

"The insured person is free to choose, at the beginning of his illness or in the course of treatment, his own doctor, his chemist and his hospital or clinic. In the case of a private hospital or clinic it must be on the approved list of the Social Security authorities. Expenses are reimbursed as incurred (the doctor may call on the patient or the patient may attend surgery. The patient may be treated by a general practitioner or by a specialist, etc * * *), so that the free choice of the insured person is not limited by financial considerations."

"The doctor is also free to prescribe whatever medicines, drugs, appliances or forms of treatment he considers necessary irrespective of cost. Approval by the agencies is necessary only in a limited number of cases involving heavy expenses, such as a long stay in a sanatorium, costly appliances and complicated surgical operations."

"Except in cases of industrial injuries and treatment in state hospitals or private hospitals approved by an agency, the French social security scheme prefers that the insured person should pay all his medical bills and subsequently present a claim for reimbursement. Except for serious operations and prolonged treatment, however, these medical expenses are not repaid in full, and the insured person must in principle bear 20 percent of the cost himself."

The approach in the French social security scheme to paying the costs of prolonged or catastrophic illness contrasts with that of most "major medical" insurance being written today in this country.

As stated above, in France the insured person, in principle, bears 20 percent of the cost of his medical care himself except in the case of chronic or prolonged illness, in which reimbursement is 100 percent. Full repayment of medical expenses in accordance with the applicable scale is made in cases of incapacity for work lasting more than three months, *irrespective of the nature of the illness* or for continuous treatment for at least six months. Tuberculosis, cancer, mental illness and poliomyelitis are specifically mentioned as examples of prolonged illness for which 100 percent reimbursement of medical care costs is possible.

Another feature of the French health insurance system is the "waiver of premiums" feature during a period of unemployment.

"To qualify for benefits it is necessary to have been in paid employment or following an occupation legally considered as such, for at least 60 hours during the three months preceding the beginning of medical treatment, as regards benefits in kind, or during the three months preceding the date of cessation of work as regards cash benefits. No disqualification is incurred if the insured person is involuntarily unemployed during the whole of this period of three months.

If the period of incapacity for work should exceed six months, cash benefits will only be paid if the insured person has been registered for at least 12 months on the first day of cessation of work and can prove that he has been in paid employment for 480 hours during these 12 months and more specifically for 120 hours during the last three of these 12 months, unless he has been involuntarily unemployed for an equivalent period."

NORWAY AND SWEDEN

Both Norway and Sweden have striven toward decentralization in their national health insurance programs. In Norway there are about 750 local insurance offices, usually one in each commune. Each of the local offices is a legally independent, self-governing insurance company, directed by national laws and rules but permitted leeway to adjust to local conditions. The National Insurance Institution sees that the local offices function according to law, determines how much they shall collect in premiums, settles disputes appealed from local complaints committees, sends out auditors and inspectors and helps if extraordinary expenses bring a local board into difficulties.

In both Norway and Sweden where the member contributes half or nearly half the premium cost of the insurance, premiums vary among districts and associations, depending on the rate of illness, how well the fund is administered, etc.

The following thoughtful comments on the Swedish program are those of Ernest Michanek of the Swedish Ministry for Social Affairs, Labor and Housing which were received in response to the committee's request for information on the health insurance program covering government employees.

"*The basic principle behind the Swedish scheme is simply this: since everyone runs the risk of becoming ill, everyone should be assured some protection against the economic consequences.*

"Formerly, government employees and large groups of salaried employees in private business had medical benefits and daily compensation by contract with their employers. Only a few manual laborers enjoyed corresponding advantages. They and other citizens could turn to voluntary health insurance societies, which were government sponsored and subsidized. But the voluntary associations were not open to everybody. Those who were over a certain age limit or in poor health were granted coverage only under special circumstances. Obviously, it is just these persons who most need health insurance, yet they cannot be accepted under a voluntary plan because they would drive up the premium costs, and that in turn would discourage others from joining.

"The compulsory scheme equalizes advantages among all groups, and, by taking 'the bad with the good' from the beginning, has distributed the costs over the whole population.

"Membership in the old voluntary associations was fairly large—about 60 percent of the population over 15 years of age. If the children of the members are included in the estimate, the figure was about 70 percent. But that is hardly adequate coverage from a social point of view. Of course, some of those who did not join the voluntary plan did not need it—employees who had health benefits from their employers, for example. However, lack of membership was most frequent among low-income families who needed the insurance most.

"Membership in the new health insurance plan is obligatory for every individual over 16 years of age. And as pointed out above, the children of these members are covered by the parents' insurance.

"The new insurance is organized in much the same way as the former voluntary system. The voluntary health insurance associations have been converted and their funds taken into central and local bodies which administer the compulsory scheme.

"*Central and Local Associations.* There are 31 central health insurance associations in the country—covering one province or one city each. Affiliated to the central associations are 631 local bodies, each of which serves one or more municipality. There are no local associations in those cities which have a central association.

"The relationship between the central and local associations is primarily financial. In order to equalize the costs among the local units, the central associations assume a good deal of responsibility for the liabilities of the local affiliates. A central association also exercises a certain supervisory power over its affiliates and takes care of part of

their bookkeeping and statistical recording. However, benefits are always paid out by the local associations, even if the central body bears the economic responsibility for these obligations.

"Each health insurance association is an independent corporate entity, responsible for its activities and financial solvency. Needed resources beyond contributions from employers and the government must come from member contributions. This means that contribution rates vary from association to association. If the rate of illness is low in a district and if the association is well administered and in a good capital position, contribution rates will be low and vice versa.

"Each association has a constitution of its own which regulates its activities within the framework of health insurance legislation. Business matters are dealt with by a board and a representative body chosen by local authorities. The representative councils of the local affiliates in turn elect the representatives for central associations (except in cities which have central associations, where the representatives are chosen by city authorities).

"The board of a central association is composed in part of members selected by the National Health Insurance Board, the Royal Medical Board and the county council.

"Formerly there were also government approved insurance societies whose areas of activity were determined by the industry or trade covered—for example, the Swedish Lumbermen's Central Health Insurance Society. There was also a special health insurance association for the deaf and dumb. Associations of this kind do not fit into the new organization and therefore are no longer active.

"*Under the new arrangement, the associations cannot carry on any kind of business other than health insurance.* However, the national government may require them to assume additional social tasks. A good deal of work connected with employment injury insurance has fallen to the health insurance associations, even in instances where they are not responsible for the benefits according to the rules set up when the two systems were co-ordinated.

"*Supervision and Complaints.* The health insurance associations are under the supervision of the National Health Insurance Board (Riksforsakrings-anstalten).

"In addition to overseeing the activities of the associations and sending out necessary directives, the National Health Insurance Board follows the economic development of the individual associations and of the scheme in general. It must also approve the contribution rates which each association decides to charge, as well as the salaries and pensions of all managerial personnel. The National Health Insurance Board further apportions the government and employer contributions among the associations.

"Complaints may be referred to the National Health Insurance Board. If a member is dissatisfied with a decision his association has made concerning his insurance, he may enter a complaint with the association within one month. The association, in turn, comments on the complaint and sends it along to the National Health Insurance Board for final decision. Certain cases may be further appealed to higher government authorities."

APPENDIX C

HEALTH PLAN CONSULTANTS COMMITTEE
LOS ANGELES 28, CALIFORNIA
December 26, 1958

Memo To: Samuel Geddes, Chairman
Assembly Civil Service and State Personnel Committee

From: Ted Ellsworth, Chairman

Regard: Pooling of Health Insurance Programs

Much consideration has been given during the past few years to ways and means of insuring small groups for hospital, surgical, and medical benefits. As health insurance programs become more prevalent, the plight of the worker in the small group becomes more accented.

There are several areas in which he faces serious problems:

(1) *He must have insurance to maintain his economic status in the community.* The effect of health insurance programs combined with new medical discoveries and inflationary rising medical costs tends to make it mandatory that any worker have some type of protection against the terrific catastrophic costs of any serious illness.

(2) *High Administrative Costs.* The smaller the group, the more of the premium dollar goes toward administration. This will vary by company but in many cases 50 cents of each dollar paid for health protection goes for administration. Normal charges made by one company are as follows:

10,000 or more insured	4½- 6%
5,000-10,000	5-10%
1,500-5,000	7-12%
500-1,500	10-15%
100-500	12-20%
Under 100	20-35%

Brokerage fees vary from ½ percent-12 percent. These figures may appear high but as yet few companies have found any practical way to reduce costs especially in the small cases of under 25 lives.

(3) *Restricted Coverage.* In addition to higher costs, the small group will usually be restricted by exclusions for pre-existing conditions, mental illness, alcoholism, tuberculosis, and other conditions and limitations on hospitalization, coverage in the higher age brackets, and treatment of some catastrophic conditions such as cancer. Many other restrictions such as limitation on type of practitioner are more apt to be found in the small group policy. Health statements or preinsurance health examinations exclude many from coverage.

(4) *Base for Spreading Risk Too Narrow:* An additional charge must be made by a company because of the narrow base for spreading the risk taken by the company. For example, in a case of 25 lives the annual premium could be estimated at $3,000. One serious accident or one serious cancer or heart case can use the entire premium and cause immediate concern to the insurance carrier, perhaps cancellation. In a case with a $1,000,000 annual premium many such cases can be absorbed before a crisis arises. Additionally because the risk is narrow,

reserves must be much greater than in larger cases—perhaps another 10-20 percent.

(5) *Continual Threat of Increased Premium or Cancellation:* The history of small cases is one of dissatisfaction by both the insured and the insurer. Since the insurer must make money, it must of necessity become alarmed when a 25-100 life case nears 70 percent ratio of paid claims to premiums. In a case of 10,000 lives, the breaking point would be nearer 85-90 percent. Thus, the small group case must face more often the threat of increased premiums, further restriction in coverage, cancellation, and the search for a new carrier to assume a doubtful risk.

During the past several years many efforts have been directed toward solving this problem. Even President Eisenhower has pointed out the necessity for pooling small employers, farmers, the aged, and others, into groups so that proper health coverage can be secured.

Many companies have made efforts to achieve the same purpose by so-called community pooling of certain types of persons. Blue Cross and Blue Shield achieve a measure of stabilization for the persons leaving a group through putting all such conversions in one category. Several companies have done the same with the over 65 group.

Many companies and agents, recognizing the success of labor-management funds, have gone extensively into the retail merchant association type coverage. Thus we find cosmetologists, barbers, independent janitors, retail paint stores, small manufacturers, retail furniture stores, garages, and many other small establishments banding together through an association for the purpose of buying adequate group health insurance. Now, even home owners associations and individual workers of a like nature are thinking of group buying through such an arrangement.

One group that I might mention is the retail furniture stores in Los Angeles. Many of these are an especially bad risk. A large number could not buy insurance any place at any price. However, through an association, they are all able to get a fairly adequate program. While the association program is not entirely satisfactory, it is far better than the stores could buy independently, and even though rates have had to be increased periodically the members have always been able to get some type of coverage at a price they could pay, even though many individual units were completely uninsurable.

This same principle can be applied even more readily to governmental programs, and has to some degree through the California State Employees Association and the various teachers' programs. Even though this coverage is paid for entirely by the individual and tends to become selective and overloaded with bad insurance risks it is far better than the average individual could buy.

Two methods of pooling interests could be developed by governmental bodies:

(1) Municipalities could band together for purposes of buying group insurance as they do for other purchasing. The South Bay-Centinela Valley area in Los Angeles gives a striking example of what might be

done. Following is a chart showing the estimated number of employees in each of the 11 cities in this area:

City	*Number of employees*	*Amount of contribution by city*
Manhattan Beach	75	100 percent for worker only
Hermosa Beach	75	100 percent for worker only
Redondo Beach	230	100 percent for worker only
Palos Verdes	75	100 percent for worker only
Torrance	530	50 percent for worker only
Hawthorne	170	100 percent for worker and 50 percent for dependents
Inglewood	500	Not known
Gardena	100	100 percent for worker only
El Segundo	100	100 percent for worker only
Lomita	25	Not known
Rolling Hills	25	Not known
Total	2,305	

The administrative costs of these programs vary from a low of about 10 percent (a Blue Cross case with no broker's commission) to a high of about 35 percent. By getting the entire 2,305 persons in one program, the administrative cost could be reduced for all to a figure around 10 percent, perhaps lower.

In several of the above cities, rate increases are imminent and since no money has been budgeted for this purpose a reduction in benefits may be necessary. In any event the risk is so narrow in every case that the stability of those not already endangered can be by a very small number of expensive claims.

(2) The second method of grouping governmental agencies could be through enabling legislation either on a state or county basis that would provide a system similar to the state retirement program. If a central agency would make available a health insurance program that could be purchased by local agencies, under well-defined rules, at the option of the local agency, then an adequate health program could be developed that would compare favorably with any labor-management program in the State. The small municipalities could buy an adequate program at a price they could afford, unnecessary costs would be reduced, and stability could be achieved. Many other subsidiary problems could be overcome by such an all-inclusive program. I am thinking especially of the problems of local government in dealing with agents and brokers. I am told that in one of the cases in the South Bay area that the insurance commission is split among 22 brokers. Which one in such a case will take the responsibility of policing the medical and hospital professions as well as the insurance carrier?

In such a program, however, thought must be given to local administration. In this respect, such a plan would differ from the State retirement program. Just as insurance companies have found it practical to give draft book authority to agents or administrative agencies in certain areas so would a state or county find it necessary to decentralize the administration so that local claims, medical and hospital problems could be settled at the source of the problem—not by some agency in a remote area that knows very little, and perhaps cares less about local situations.

In conclusion, please let me state that figures quoted are estimates. Actually the administrative figure is more closely associated with the amount of premium rather than the number of people involved. I have merely used the word "people" instead of "premium," as this figure can be more closely related to the problems of any group.

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ASSEMBLY INTERIM COMITTEE ON INDUSTRIAL RELATIONS

to the

1959 SESSION OF THE LEGISLATURE

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March, 1959

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ARTHUR A. OHNIMUS
Chief Clerk of the Assembly

LETTER OF TRANSMITTAL

March 13, 1959

Honorable Ralph M. Brown
Speaker of the Assembly
State Capitol, Sacramento, California

Dear Mr. Brown: In compliance with the provisions of House Resolution No. 221, 1957, directing the Assembly Interim Committee on Industrial Relations to ascertain, study, and analyze all facts relating to industrial relations, the committee does herewith respectfully submit its report with the findings and recommendations of the committee.

Very truly yours,

Lester A. McMillan, *Chairman*
James L. Holmes, *Vice Chairman*
Edward M. Gaffney, *Chairman of Subcommittee on Industrial Safety*

L. M. (Lee) Backstrand
Phillip Burton
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SECTION 1

SPACE AGE MUSEUM

The Assembly Interim Committee on Industrial Relations and the Senate Interim Fact-Finding Committee on Commerce and Economic Development were assigned the responsibility of making an interim study of two proposed projects.

The members of the Senate committee co-operating in this study were Charles Brown, Chairman; Stanley Arnold, Paul L. Byrne, James A. Cobey, Fred H. Kraft, Robert I. McCarthy and George Miller, Jr. Frank Feliz, Consultant for the Senate committee, co-operated with the staff of the Assembly committee.

The two projects under study by the combined Senate and Assembly committees were:

1. The feasibility of the State of California sponsoring the establishment of the world's first "Space Age Museum," and
2. The feasibility of the State of California sponsoring the world's first "International Space Age and Scientific Exposition."

The combined committees decided, at an early date, that the museum project is one that could bear fruit within the near future, and concentrated their attentions primarily on that phase of the study.

At the same time the committee members also determined that the proposed exposition plan possesses considerable merit and deserves further study by the Legislature.

As a result of public hearings and research, the members of the committees recommend the adoption of legislation authorizing the establishment of a Space Age Museum in California.

The proposal to establish a Space Age Museum in California, the committees learned, was received with widespread approval and offers of assistance from public officials, industrial leaders, scientists, educators, labor leaders and other representatives of interested segments of society.

Early in the interim study, the Sixth Agricultural District's Board of Directors offered the use of the National Guard Armory in Exposition Park in Los Angeles as a facility for the proposed Space Age Museum. Acceptance of that offer would enable California to establish a national Space Age Museum and, being first in the field, the museum probably would become the Smithsonian Institution of the space age. Here is an opportunity that California should utilize to good advantage and help it to become and to remain the space capital of the world.

The Sixth District Agricultural Association has had a history of 47 years of operating a museum. During the last seven years it has operated the California Museum of Science and Industry which now has grown to be the second largest museum of science and industry in size and in attendance in the United States. This background of practical experience can make the museum successful because they have faced

each of the many problems that face museums over a number of years. Not only is the board of directors a qualified and competent group of men working on the development of the museum but the staff is composed of museum people who are recognized throughout the United States as among the leaders in their profession. For instance the director is President of the Western Museum Association and the chief of exhibits is recognized as having developed most aspects of the story-telling type of exhibit which has found so much acceptability throughout the United States at this time. In addition to the board and the staff the California Museum of Science and Industry now has an auxiliary, the California Museum Foundation composed of 30 of the leaders in the fields of business, science and education. This board conducts fund-raising drives and accepts gifts of property from various groups in order to provide the necessary factors to make a successful museum.

In conversations with the board, with the officers of the foundation, with the director of the museum, and with other staff members of the museum, the committee has ascertained that they would be willing to accept and are capable of accepting the responsibility of management of the museum. The Foundation Board could be broadened in order to encompass those units of industry which are important in the space age, but which are not now represented in the Foundation Board.

In today's life there are several factors necessary for the operation of a good museum. Among these are a building, parking facilities, a competent staff, an auxiliary capable of raising funds, and an acceptable location insofar as the people are concerned. The Sixth District Agricultural Association and its California Museum of Science and Industry meet all of these qualifications. They own the National Guard Armory with approximately 65,000 square feet which could be devoted to exhibit space. In addition to this, parking facilities could be made available within one and one-half blocks of the armory. It is the opinion of the committee that this building could be made available and the National Guard itself probably would support the transfer of its facilities to other areas, insofar as the museum staff is concerned. This report previously has indicated that the personnel at the California Museum of Science and Industry is highly recognized and acceptable within the museum profession. As a result it would not be necessary to build an entirely new staff, but the professional knowledge of the current staff could be used to make the museum successful almost from the onset. Most of the material for the same will come from private industry and normally the task of transferring such properties to the State are so arduous that few companies would attempt to undertake this. The existing auxiliary to the California Museum of Science and Industry, the California Museum Foundation, is capable and has a past experience of receiving gifts from the industry and of securing the funds necessary to operate and maintain these gifts. Most museums have found that as the communities have grown up that the museums have become either parts of the fringe of the town or are located in the slums of the community. The California Museum of Science and Industry and the National Guard Armory in Exposition Park are specific exceptions to this rule because they are within five minutes of the downtown area and sit at a cross-

road of freeways that would enable persons from anywhere in Southern California to reach the same within a comparatively short time.

In order to secure material for the museum and to secure funds from private industry it is necessary to assure these groups that a sizable audience will view the exhibits. The California Museum of Science and Industry will have by 1960 an audience of one million persons each year and with the completion of the new sports arena located within one-half block of the armory, the existence of the county museum in the coliseum in the same park, it is estimated that more than 7,000,000 people will visit Exposition Park each year. Our investigation discloses that a large available audience is essential for the success of the Space Age Museum and if the same is located in Exposition Park it is estimated by competent authorities that it will have an attendance of at least 500,000 persons the first year of operation.

The committee believes that it is necessary, if possible, to avoid the creation of a new commission, or a new agency, but to make use of an existing group which has had, over the years, a record of success in the field of museum management.

Expert witnesses at the hearings and individuals who communicated with the committees on the subject stressed that a Space Age Museum in California would serve as a memorial to the individuals and to the industries of California, and the United States, who have pioneered and are still pioneering the spectacular interplanetary developments of our times, and that it would be a fitting and a valuable institution for the collection and the preservation of the memorabilia of our space age.

In the past, virtually every museum founded to depict the birth and the progress of a new industrial or cultural age has been established many decades after its beginning. During those passages of time too many of the more valuable and interesting exhibits were destroyed, lost, or irreparably damaged.

Possessing, as we do today, that knowledge of the dangers of delay, and with the realization that we are now privileged witnesses of the birth of a new industrial and cultural era, it would be comparatively easy and immensely fruitful to commence the collection of a permanent set of space age exhibits, and to add to them as our interplanetary era continues into its normal realm of development.

Research and the public hearings revealed that the establishment of the world's first Space Age Museum, in California, would possess numerous cultural, educational, economic and entertainment features of genuine value not only for the people of California, but for the people of the United States and for the people of other nations, because the museum would feature dramatic exhibits of our space age in the realm of national defense and in the field of peacetime industrial pursuits.

The present and potential commercial and other forms of utilizing of solar, atomic, chemical and electronic energy would be emphasized in a spectacular manner.

In the realm of national defense, exhibits would include actual existing and unclassified interplanetary "hardware" such as rockets, satellites, space platforms, missiles and other similar products of our new space age. In those instances where an actual product would not be available for display for any reason, lifelike replicas would be manufactured and displayed.

As time goes by, the envelope of secrecy encompassing many of the more fantastic defense devices of our own, and those of other countries, will be removed so that they will be eligible for public display in the contemplated museum.

Exhibits that possess especially compelling public interest and educational features would be explained in detail through lecturers who are experts on their specialized subjects, by motion picture shorts, by photographic and other types of artwork, and through many other means of communication.

While space age developments are now particularly dramatized in the area of national defense, the peacetime pursuits of our interplanetary era undoubtedly will exert even greater political, social, economic and moral impact upon man.

The space age is advancing much more rapidly than any other industrial, economic or cultural revolution known to history, and its major developments probably will be achieved by the scientists, the industrialists and the technicians of tomorrow who are the school children of today. For that reason, witnesses declared, the emphasis associated with any such Space Age Museum should be placed on the education of today's boys and girls.

Some of the statements or excerpts from testimony or communications, bearing on the subject of the interim legislative study, are presented in the following pages of this report.

GOVERNOR EDMUND G. BROWN

I would like to say at the outset that I wholeheartedly support the proposal to establish a "Space Age Museum."

In these days of tremendous scientific rivalry with the Soviet, we would do well to emphasize both our accomplishments and our goals in this sensitive field.

California has long been a well-spring for new ideas, new developments in science and industry. Its role in the birth and development of the space age—both in private industry and our great educational institutions—has been a leading one. It is a role which should be dramatized to our own citizenry and to the world.

At the present time, much of our emphasis in this expanding new field is necessarily on its military potentialities. But it is apparent to me that in the years ahead its peacetime aspects will loom ever more important in the destiny of mankind.

Our goal is universal peace. To achieve it our citizens of tomorrow should know the proud legacy of scientific knowledge and industrial development on which the world of tomorrow will be based.

A Space Age Museum would fill that need. It would be both a tribute to the men and women who have pioneered this amazing new era and a repository for preservation of its memorabilia. Set up as a self-supporting institution it would eliminate the necessity for any additional tax burden, yet it would be a valuable addition to the educational, economic, cultural and entertainment facilities of this great State.

My deep appreciation goes to the California Museum of Science and Industry for its offer of a building to house the Space Age Museum.

Your committees are to be congratulated for the vision they have displayed in bringing this tremendously fruitful project into being.

DR. RAYMOND B. ALLEN
Chancellor, University of California at Los Angeles
Member, Board of Directors, Sixth District Agricultural Association
Member, Board of Directors, California Museum of Science and Industry
Vice President, Board of Trustees, California Museum Foundation

As an educator, as a person who assisted in the development of certain exhibits at the Chicago Museum of Science and Industry, and as a board member of the California Museum of Science and Industry for a number of years, I wish the Assembly Interim Committee on Industrial Relations and the Senate Committee on Commerce and Economic Development to know that I wholeheartedly endorse both the principle of a Space Age Exposition and the principle of a Space Age Museum.

It is becoming increasingly obvious to those of us in the educational field that the effective use of museums and their collections can be one of the most valuable tools available for the school and the colleges. If we are to keep our young alerted to the age in which they live and the age in which they soon will live, we must provide visual evidence of the changes in their existence.

It is my own sincere belief that the Space Age Museum could best be located in Exposition Park in Los Angeles because of the possible availability of the National Guard Armory for exhibit purposes and because of the very fine museum management now operating the California Museum of Science and Industry. One of the chief difficulties in establishing any educational tool is the acquisition of accreditation in the sense of materials to be offered to the public. As a result, it would seem to me that the proposed Space Age Museum might well be enhanced considerably if it were to be operated by an experienced group of museum administrators.

The history of the achievement of the California Museum of Science and Industry in the last seven years is most noteworthy and for that reason I propose that such a Space Age Museum be administered by the board of the California Museum of Science and Industry and that it be guided in those principles and in its philosophy by the Board of Trustees of the California Museum Foundation, a group of conscientious public citizens who have done wonders in building the Museum of Science and Industry.

JOHN M. ANNAND
President, Joint Council of Teamsters No. 42
Los Angeles, California

The stake of organized labor in our new interplanetary age is a tremendous one. The brains and the brawn of our skilled workers are the twin tools that have fashioned, and will continue to fashion into shape the space age articles, implements and instruments conceived by the minds of our scientists. As we leave the conventional field of industrialization which we have known for so long, and enter the new one that space age developments is creating, new occupations and new trades will come into existence. The men and the women who are members of organized labor can be counted upon to perform their assigned roles in this spectacular venture into the outer world. Few people realize the extraordinary age of science which is enveloping us. We

should employ every device and every opportunity at our command to acquaint our people with coming changes which will so deeply affect each and every one of us.

The establishment of the world's first space age museum at this time, and a continuing study of the feasibility of establishing the first interplanetary scientific and space age exposition, represent two of the finest possible mediums through which to educate and to inform our people about the past, the present and the future of a thrilling new era upon which mankind is embarking.

ROBERT S. BELL
President, Packard Bell Electronics
Los Angeles, California

A Space Age Museum would bring together the ability, resources and knowledge of the leading military and civilian organizations. It would constitute a review of the tremendous accomplishments to date and permit some grasp of what remains to be done. It would act as a stimulus and a path towards making maximum use now, and for the future development of, the tremendous brainpower, skills and know-how of California. It would contribute to the advancement of knowledge, the commercial development of our State, and by these methods, ultimately to the defense of our Country.

It is very important to the development of our Country that we have available something to stimulate the imagination of people of all ages who can contribute to the scientific advancements we are trying to make today. We have made more advances since the turn of this century than we did in the previous 1900 years. Things are moving so fast that the ability to bring some background to the people can only be done visually by a large organized project such as a space age conference, or a space age museum or exposition. In them we can offer some idea of the grasp of the problems that are being faced today and the social, commercial and military reasons why constant advances must be made. We recently had a most successful space conference here in Southern California. It was so successful that it will be conducted annually. It was the first one in history. The tremendous interest involved is indicated by the 500 commercial exhibitors who paid to show their skills to the public. We were open three days and had an attendance of more than 100,000 visitors.

This will give you an idea of the impact that a Space Age Museum would have on the public.

RICHARD, G. CANNING
Automatic Data Processing and Production Control Systems
Los Angeles, California

Your preliminary report states that experts estimate that 50,000,000 people would attend the exposition, over a period of four years. Several years ago, the Los Angeles Junior Chamber of Commerce investigated the possibility of a world's fair for Los Angeles, and a figure of 50,000,000 in two years was determined to be a fair estimate. So I believe that your figure of 50,000,000 in four years may be conservative.

HUGH L. DRYDEN
Deputy Administrator, National Aeronautics and Space Administration
United States Government, Washington, D. C.

I am personally very much in favor of the broadest dissemination of knowledge to the public concerning scientific and technological achievements in the fields of aeronautical and space activities. It appears to me that the proposals for a Space Age Museum and an Interplanetary Scientific and Space Age Exposition are well designed to serve a very worthwhile purpose.

D. C. DUNCAN
President, West Coast Electronic Manufacturers Association
Los Angeles, California

We believe that California has played a highly important part in the early development of the Space Age. A museum would serve to draw the attention of our local citizens to this fact and to the continually growing importance of the Space Age to California. Other areas of the country would be encouraged to look toward California as the center of space technology and production. Thus, new supporting industries would be formed within the State and would be brought in from other parts of the country. This would be a repeat performance on a larger scale of what has already happened in the aircraft industry and, more recently, in electronics.

A museum could gradually become a collection of historical exhibits which tell a story of man's entrance into space. The exhibits would probably best be constructed for the specific purpose of telling this story rather than being merely samples of commercial and military products, such as might be used for an exposition.

J. HOWARD EDGERTON
President, Sixth District Agricultural Association
President, California Museum Foundation
Los Angeles, California

Since the first publicity came out on the possible proposed space museum, I have been extremely interested in the development of it. I have discussed the matter with our Sixth District Board, and most of the members of the California Museum Foundation Board, and I can say without hesitation they were very sympathetic with it. They feel it has considerable merit from an educational standpoint, and they think that it is sound, that the State should lay the foundation for a future development of this kind with full knowledge that considerable support would have to come from private industry in order to make it successful. We have learned in the California Museum of Science and Industry that possibly one of the reasons why we have not had more support from industry in the past, is because they haven't been asked for it. One of the changes in the philosophy of the management of our museum during the past few years has been the philosophy that we are going to insist on the major support coming from industry, for the future developement of our museum instead of begging Sacramento for that support. I would like to point out that out of the next $525,000 investments in exhibits in our museum that will be made, $425,000 of that is coming from private industry, and it is the policy of the management of the museum that industry not only be given an opportunity but be asked very

aggressively for this very worthwhile educational element that we have going here. I would say that it is true, I think it is sound, that if you promote a space museum, that you could, ask for and receive, considerable support from industry in the future. Our own facilities here, as you have been told, are available to you. We will give you every possible co-operation if you should decide to ask the Sixth Agricultural District and the California Museum Foundation to assist in whatever further development that may take place on this project. We have the State-owned land. We have buildings which are already erected. We have the framework of very capably trained personnel in museum management. This is extremely important. I just want to assure you that our board, both the Sixth District and the California Museum Foundation, will co-operate with you 100 percent in the event that this project is approved. The California Museum Foundation Board is composed of a very representative group of scientists, educators, industrialists, and civic people, a cross section of our community. They are helping us on our own museum, and we would have room on there for anyone else that might be necessary to further this specific space age program.

DUDLEY FORTIN
Manager, California State Fair and Exposition
Sacramento, California

The Board of Directors and Management of the California State Fair and Exposition wish to express deep interest in the future development of a Space Age Museum and in the purpose which such a project represents.

We are now at the present time developing plans for the new California State Fair and Exposition on a 1,065 acre site in Sacramento which is scheduled to open in 1961. We feel that the new fairgrounds would be an ideal year-round location for such a project and we shall welcome the opportunity to discuss this matter with the proper committee when called upon.

SCOTT L. GLENN
Scott Glenn Enterprises
Hollywood, California

We feel that the project could play an important part in helping to supplant our State's dwindling natural resources by strengthening our economic structure.

J. C. HOFFMAN
Manager, Production Information, Missile and Ordnance Systems Department
General Electric Corporation, Philadelphia, Pennsylvania

We consider this a very forward looking effort.

DR. JOSEPH KAPLAN
Chairman, United States National Committee for the International Geophysical Year
Professor of Physics, University of California at Los Angeles

The history of modern aeronautical science in the United States literally revolves about Southern California. Southern California would be remiss if it did not take long-range, ambitious and imaginative steps to establish a museum of space science.

The impact of "Sputnik I" on our national consciousness has drawn our attention to the fact that every means possible by which the general

public, but children in particular, should be educated in science—every such means is essential for the future and the security of the United States.

A space age museum would be a genuine and significant contribution to that effort.

I spent 23 days in the Soviet Socialist Republics this summer and one of the most striking things I saw there was a permanent exhibit in Moscow housed in 65 or more elaborate buildings and costing more than $100,000,000. One of the buildings was devoted to space age exhibits, including a perfectly flyable replica of "Sputnik III," which was really quite interesting to view.

The purpose of the exhibit was to bring people from all over the Soviet Union and satellite states to show them the results of Soviet scientific endeavors and to create pride in the Russian people over the accomplishments of their nation in the scientific fields.

I believe that the State of California should sponsor the establishment of a Space Age Museum, as quickly as possible, and to enlist the assistance of all segments of our California communities in that worthwhile endeavor to help educate our people, and especially our children, in space age developments.

DAN A. KIMBALL
President, Aerojet General Corporation
Azusa and Sacramento, California

I want to commend the California Legislature and its two committees for their forward looking activities to prepare California for the impact of the Space Age. I am enthusiastic about the plan to establish a Space Age Museum in Exposition Park.

The Space Age is bringing changes more swiftly than any previous industrial or scientific revolution in our history. Its potential is virtually without limit.

California already has forged to the forefront in the field of rockets and missiles. It is important to the State's economy and well-being to maintain this leadership as the Space Age gets into full swing.

I can think of no better way to highlight the State's present activities and promote the establishment of new Space Age industries than to establish a state-sponsored Space Age Exposition and Space Age Museum, as recommended by your committees.

Activities like these will pay off in many ways. The best scientific accomplishments of all nations can be brought together and applied towards peace and a better life. More youngsters could be interested in careers in science. Many new jobs in new industries will be created.

I heartily endorse your plan and urge its speedy adoption.

D. P. LOKER
Vice President, Star-Kist Foods, Inc.
Terminal Island, California

The idea of the immediate establishment of a Space Age Museum is excellent. It will give the museum staff and committees concerned a rare opportunity to collect and display articles and items currently extant, and as the Space Age develops the collection can develop hand in hand.

Inasmuch as such a project would be of inestimable value historically and educationally to the people of the West, and California in par-

ticular, I would favor such a project being under state control rather than federal.

DANIEL L. MacDANIEL
President, Disclosures, Inc.
Corona, California

Although our company is small, we would be happy to contribute in any way possible. We wish to offer our encouragement and support of your ideas.

A. G. MARQUARDT
Secretary-Manager, 50th Agricultural Association
Lancaster, California

This Space Age concept offers an excellent vehicle for national publicity for the State of California.

PAT MARTIN
President, California Research Council
Sacramento, California

From an economic standpoint, the impact of our space age upon the industrial fabric of the United States has been exciting, explosive and dramatic. While the average citizen has read some interesting articles about Sputniks, Vanguards and Explorers orbiting around Mother Earth in outer space, too many of them think of these fantastic devices as "Buck Rogers" comic strip creations, as though each were a giant yo-yo jerked into action and maintained in motion by some invisible hand on earth.

Too few realize the tremendous scientific and industrial advances that have been made to achieve the remarkable feat of projecting these interplanetary instruments from earth hundreds of miles into the sky.

By establishing the world's first Space Age Museum, California would thereby help to emphasize its role in our new interplanetary era and enhance its opportunities to obtain new space age industries.

Students of this era of megatons and missiles tell us that the world around us will change at a faster rate than ever before in history. The advances in science, medicine, technology and industry are being accelerated at a pace resembling geometrical proportions when compared with the leisurely metamorphosis and slow evolution that was the order of the day during the 1900 years between the turn of the last century and the time of Christ.

Experts in the space age field of endeavor report that the economic benefits of our interplanetary era are staggering to contemplate.

The Space Committee of the House of Representatives, of the Congress of the United States, for instance, in a recent report stated, "If the space age is entered by the United States with the boldness it deserves, the next five years should see all talk of unemployment in this country replaced by the greatest labor shortage in our history."

I would like to provide you with one local example of what economic advantages a space age industrial plant can mean to a community. You have visited the nearby plant of the Aerojet General Corporation, and it is the example that I have chosen to illustrate my point.

Three years ago, it employed 500 workers. Today it has approximately 10,000 employees. Half of these workers have come from outside the

Sacramento area and, with their dependents, represent 14,500 new residents here. These newcomers require 5,600 homes, on which the county receives $2,000,000 annually in taxes. They boost retail sales $18,000,000 a year. They increase bank deposits $11,000,000 a year. And they have created 5,000 new jobs in other fields by their demand for goods and services.

This one company has spent $80,000,000 on plant construction and facilities within the past few years and another $20,000,000 in new construction is now underway.

It spent $90,000,000 for the purchase of materials and supplies last year, expects to spend $120,000,000 for the same purposes this year, and buys these materials, supplies and services locally whenever they can be provided by local sources.

The firm has an annual payroll that is approaching the $50,000,000-mark. It is estimated that the average paycheck dollar, by the time it has gone through the business tills of the butcher, the baker and the candlestick maker, adds $12 to the economic welfare of the community in which it is spent. In this instance, Sacramento County and environs, by that standard of calculation, benefits to the tune of $600,000,000 a year in economic dollar activity from this one space age industrial plant.

California, because it possesses climatic, topographic and other important advantages peculiarly attractive to space age industrial activities, could easily promote the establishment of literally hundreds of such beneficial space age industrial activities.

MAJOR GENERAL J. B. MEDARIS, USA
Commanding Headquarters, U. S. Army Ordnance Missile Command
Redstone Arsenal, Alabama

I feel, generally speaking, that anything that will provide an opportunity for the early collection and perpetuation of the progress of the United States in the Space Age will be of great value.

EDWARD L. MONTGOMERY
General Counsel, Aeronautronic Systems, Inc.
Ford Motor Company, Glendale, California

I believe that the museum might be a very worthwhile undertaking and I think that California is an appropriate location for a project of this nature.

SVARRE PETTERSSEN
President, American Meteorological Society
Boston, Massachusetts

I would like to take this opportunity to wish you success in your endeavors to stimulate interest in the problems of the Space Age.

DR. SIMON RAMO
Executive Vice President
Thompson Ramo Wooldridge Company, Los Angeles, California

We are rightly concerned as a Nation about survival in the near term and thus must place high priority on military research and development and other defense projects to ensure our survival. However, our Nation's position in the world, in the long run, is determined by the more fundamental matters of education and "brain power." We must increase by

manyfold the awareness by young and old of the highly technical society towards which we are headed. Our appreciation must be greater for the need for world co-operation so that social development will not lag behind the rapidly accelerating technological advance and bring us to world chaos.

Your projects are outstanding examples of what the State of California can do to help bring about this greater understanding of the nature of the world ahead. It is entirely fitting for the State of California to take the lead in these projects. The contributions by the science and industry of California are second to those in no other state in the Union in the field of space and missile technology. No state should find it possible to put together a finer museum or exposition, and our prospects for contributions in space science during the next few decades are even more outstanding compared with other states. The United States should take the lead over other nations in such proposals. If California moves ahead on this, it will cover well the national need, because California is so available and attractive to visitors from all over the United States and the rest of the world.

There is no question but that public-spirited representatives of industry and science of California will be wholeheartedly behind these projects and will provide that kind of support without which it cannot be a success no matter how well it is backed by legislative and state budgetary actions. Of course, over a period of years the costs will probably be more than covered by the benefits. We should be wise enough to see that an expenditure for this class of educational project will be deserving of the relatively small sacrifices that it might appear to require from the financial standpoint of the taxpayer of California.

GEORGE RHODES
Aviation Editor, San Francisco Call-Bulletin
Correspondent for American Aviation Publications, San Francisco, California

I would like to say, for the record, that planning for an international proposal of this type has been overdue for at least two years. I travel very extensively. I'll be going to Europe for the third time in 18 months within a few weeks. I attend most of the missile and rocket displays of this government and other governments. We who write in the technical field understand what is going on, but, unfortunately, the public has very little means of understanding the impact that the Space Age has on our economy. I think that the only way to put it over, since it hasn't yet been put over, are projects of this nature. As immediate past president of the Aviation Writers Association of the United States and Canada, I can say that our organization will be happy to help in any way that we can to promote them.

EDMUND V. SAWYER
President, Crescent Engineering and Research Company
El Monte, California

We welcome your proposed plans.

DR. S. F. SINGER
Associate Professor of Physics, University of Maryland
College Park, Maryland

I thoroughly approve of the plan to set up a "Space Age Museum." I think it will be of extreme interest to people, and I feel sure also that

it will influence young people in choosing a scientific career. You ought to be congratulated for taking the initiative in this important venture. For my part I will be happy to support it in any way I can, i.e. by providing exhibit material.

ROBERT R. STEIN
Assistant Manager, Western Fairs Association
Sacramento, California

Those of us whose job it is to sell, tell and show through the media of fairs and expositions believe them the best possible means for effective communications.

Exhibits are somewhat like money. No one has yet found a substitute that will work quite as well for its specific job. There is no means of communications, of storytelling that can excite all the senses (touch, sight, smell, hearing, taste) as well as an exhibit or display.

To best tell and preserve the amazing story of this Space Age era unfolding around us daily, I believe your two committees have made a prudent and fruitful decision in selecting an exposition-museum as your tool for communications to the people.

We are surrounded by technology that has made new products and processes possible. But, the drama, the development, research and experimental workaday world of technology is usually located far behind chain link fences. We take our children for a 70-mile-hour drive along our highways and pass right by the industrial plants where the wonders of tomorrow are being developed by scientists of today. Our children see the fence or the skyline of a factory.

Uncle Sam tells us that by 1968 the United States will be short 100,000 scientists and engineers. Currently, Russia is educating approximately 25,000 more engineers and scientists each year than America.

How can this be true when in California, according to figures from the State Department of Finance, there will be a bumper crop of 1,400,000 children of secondary school age in California by 1968? This is a growth of 588,000 over our present secondary school enrollment of 840,000.

I submit that throughout the United States our young people who have a potential interest in science and engineering, and have been given a fine academic exposure to these subjects, are nonetheless missing something. That something is what has caused and is causing the projected shortage of engineers and scientists.

Telling the story of space age technology at work is a task that will require the most imaginative talents available. It should be told simply. People should be able to get in the act—push buttons, pull levers and participate in the thrill of a Space Age adventure. Some will have a full appreciation of the technical aspects, many will meet the subject for the first time in its three-dimensional closeup form.

The proposed Space Age Museum would be one excellent approach in achieving the objective of educating our people in Space Age developments.

H. STRUNGHOLT
Professor of Space Medicine and Advisor for Research, School of Aviation Medicine
United States Air Force, Randolph Air Force Base, Texas

Development in the field of space medicine biastronautics and astrobiology has reached the point where it certainly can provide material of interest for the subject, and material to insure the younger generation to go into this field.

DR. EDWARD TELLER
Director, Lawrence Radiation Laboratory, University of California
Livermore, California

It is good to know that a study to establish a national "Space Age Museum" and an "International Scientific and Space Age Exposition" is underway.

It is my belief that both the museum and exposition could serve a most worthy purpose: To create in the public mind a better and more proper understanding of scientific matters. Without such an understanding our nation is ill-equipped in the present struggle for technical supremacy. I therefore am most anxious that the museum and exposition should become a real success. For this reason I would like to make a few tentative suggestions.

It is of the greatest importance in a scientific display to have a full and clear explanation of the objects to be exhibited. Obviously the explanation must be on the level of the average visitor. At the same time it should command the sustained interest of the visitor and thereby pave the way to a better understanding. In order to accomplish all this, I believe four general approaches should be exploited.

First, the history and development of each idea and device should be carefully presented. This can be done by charts and other displays. Second, each exhibit should be accompanied by ample explanatory written material and this written material, together with further explanations, should be available to the visitors in booklet form. Third, at the site of the museum and exposition regular lectures should be given in the style of those given at the Planetarium in San Francisco. Such lectures would be particularly valuable in connection with visitors from our schools. Fourth, the museum might establish a collection of filmed material which could be presented to the public.

Of course, the success of the museum and exposition will depend primarily on the men and women who give their time to organizing them. I think this group could be aided by the criticism of a wider group of scientists, who would be asked for suggestions and for continuing criticism of the maturing plans which are presented to them.

Finally, I would like to suggest that the museum and the exposition should be undertaken by the State of California. I believe that there is enough talent and material in our State to make an excellent showing. I further believe it will be realized faster if carried out locally and I hope that we shall be of the greatest of service to our Nation as a whole by setting a high standard for a scientific exposition and museum.

C. E. VAN HAGAN
Acting Head, Technical Information Department
U. S. Naval Ordnance Test Station, China Lake, California

It is obvious that your analysis of the important part California has played in the pioneering work of space is correct, and with the proper planning and support, these ideas could be of value to the American and foreign people.

DR. RUFUS B. von KLEINSMID
Chancellor, University of Southern California
Member, Board of Directors, Sixth District Agricultural Association
Member, Board of Directors, California Museum of Science and Industry
Member, Board of Trustees, California Museum Foundation

I am greatly honored today to address this assembled group as a member of many years standing of the Board of Directors of the California Museum of Science and Industry.

I wish to announce at the very outset that I strongly endorse both a Space Age Museum and a Scientific and Space Age Exposition. Briefly, my reasons for such a belief are these:

First, a Space Age Museum would emphatically report to the United States and to the world that California is proud of her pioneering role and achievements in this great new adventure with the unknown. Such a museum at this time would establish California as the acknowledged leader in space research.

Second, a Space Age Museum would turn the puzzling and oftentimes unfamilar subject of theroretical science into understandable displays that millions of fellow Americans could appreciate and in which they could take pride. It would, in effect, act as a great educational and career stimulus to all who visit the exhibits—school children, college students and average citizens. And, I might add, the imaginative subject of space will appeal to thousands of persons who otherwise might not ever visit the inside of a museum.

Third, California would attract scientists and engineers from around the world who would want to live in a region that honors the achievements of the scientist. The museum would, in addition, serve as a focal point for our great community of scientists.

California should have a Space Age Museum. It should be located in Los Angeles because the majority of the United States' space research, aviation and electronic industries are located here. Los Angeles is, as a result, the natural setting for such an exhibit. Since space is available in Exposition Park in the National Guard Armory and since a capable, experienced museum administration is assembled at the Museum of Science and Industry, I recommend to this committee that a Space Age Museum be planned for Exposition Park and directed by the management of the Museum of Science and Industry.

R. W. WRIGHT
Manager, Westrex Coropration, Hollywood, California

We feel that such a museum would create a great deal of interest and be an outstanding attraction.

SECTION 2

MARITIME INDUSTRIAL SAFETY

During the last interim period a special subcommittee of the Assembly Interim Committee on Industrial Relations continued its sweeping and diligent study of the importance of establishing a sound safety program covering the docks, shipyards, vessels, warehouses and other facilities within the framework of our vital maritime industry.

Assemblyman Edward M. Gaffney, of San Francisco, was chairman of the subcommittee. An indication of the importance the parent committee placed on the study lies in the fact that all of the members of the parent committee were assigned to membership on the subcommittee.

1. It is the committee's recommendation that the following General Industry Safety Orders shall be added to the Labor Code.

(1) **G. I. S. O. 3254. Handtrucks.** Handtrucks shall be maintained in a safe condition. Handles shall be maintained free of hazardous burrs, splinters, cracks, or splits.

(2) **G. I. S. O. 3255. Handtools.** Handtools shall be kept in good condition, and be safely stored. Unsafe handtools shall not be used.

(3) **G. I. S. O. 3256. Storage of Materials.** The maximum weight of materials stored on building floors or load carrying platforms, except those built directly on the ground, shall not exceed their safe carrying capacity.

(b) Material, when stored, shall be piled, stacked, or racked in a manner designed to prevent it from tipping, falling, collapsing, rolling or spreading. Racks, bins, planks, sleepers, bars, strips, blocks, sheets, shall be used where necessary to make the piles stable.

(4) **G. I. S. O. 3299.2. Curbs or Rails on Docks, Wharves or Piers.** Adequate and substantial bull rails, stringer rails or curbs shall be installed at the waterside of all flush aprons on wharves, docks or piers.

(5) **G. I. S. O. 3299.5. Equipment Inspection.** The employer shall require that tools, machinery, gear and other equipment subject to wear be inspected at adequate intervals and unsafe conditions corrected. If tools, machinery, gear or equipment are found to be defective or otherwise unsafe, employees shall report the same to the person in charge of work who shall have it discarded, marked and so placed that it cannot be used again until made safe.

(6) **G. I. S. O. 3299.7. Dock Plates.** (a) Every dock plate shall be constructed and maintained with strength sufficient to support the load carried thereon.

(b) Dock plates shall be secured in position when spanning the space between the dock or the unloading platform and the vehicle. The dock plate, together with its securing devices, where used over spans of different lengths, shall be used of such construction as will readily obtain rigid security over such spans.

(c) The dock plates shall be so constructed and maintained that when they are secured in position the end edges of the plate shall be in substantial contact with dock or loading platform, and with the vehicle bed in such a manner as to prevent rocking or sliding.

(d) Adequate and safe means shall be provided for moving dock plates.

(7) **G. I. S. O. 3409. Internal Combustion Engines.** Internal combustion engine-driven equipment shall be operated inside of buildings or enclosed structures, only when such operation does not result in harmful exposure to concentration of dangerous gases or fumes in excess of maximum acceptable concentrations. Exhaust pipes shall be installed in such a manner that the exhaust products shall be discharged so as not to be a hazard to the operator.

* * * * *

2. It is the committee's recommendation that the State should establish, under the direction of the State Personnel Board and with the guidance of the State Department of Industrial Relations, a job classification entitled "Maritime Safety Engineer," and the immediate employment of four such qualified employees with two of them being assigned to cover the maritime facilities of Northern California and two of them being assigned to cover the maritime facilities of Southern California.

* * * * *

During the studies conducted by the subcommittee in the last interim period, and in previous ones, it became obvious that safety measures along our waterfronts have been sadly neglected for far too long. Over the years the Legislature has made ample provisions for safety programs covering railroads, building construction, the electrical industry, mining, motion pictures, and many other facets of our economy.

But our maritime industry, the first major industrial activity of California and one of the most important reasons for our having taken the leading position among the states of the Union, has been a legislative orphan.

The Federal Government has devoted considerable attention, and adopted many suitable measures, to provide on-the-job safety measures aboard ships. But on the docks, in the shipyards, in the warehouses and throughout our waterfront facilities, the State has been consistently negligent in adopting legislation designed to protect the lives and the limbs of the workers who service those facilities.

In the past, similar interim committees studying waterfront safety practices have recommended the addition of at least 20 qualified maritime safety engineers to the staff of the State Department of Industrial Relations for assignment in our maritime areas of activity. Four such positions were allowed in the budget adopted at the 1958 Session of the Legislature. Two of them were approved and were included in the adopted budget. Actually, only one such engineer was employed, and the other position was never filled because of bureaucratic edict.

Thus, after having proved the necessity for having at least 20 qualified safety engineers on the job, the Legislature and the executive branches of our State Government have employed only one to cover the hundreds of miles of waterfronts and their myriad facilities strung along our 1,000-mile coastline.

But even the employment of only one maritime safety engineer represents a step in the right direction and, at least, recognizes that men who work our waterfront facilities deserve a modicum of the same type of protection against crippling injuries and death now afforded their more fortunate brothers who labor in more favored pursuits.

It is fervently hoped that the Legislature, in its wisdom, will enact legislation at this session providing for the number of qualified safety engineers and the General Industry Safety Orders recommended in this report.

SECTION 3

PRIVATE EMPLOYMENT AGENCIES

The committee considered two bills, Assembly Bill No. 1912 and Assembly Bill No. 2738, referred to it by the 1957 Session of the Legislature, concerning the regulation of employment agencies.

An intensive study and investigation of the practices followed by employment agencies in the conduct of their business and of the enforcement of laws and regulations governing their operations was conducted by the committee in Los Angeles in November and December of 1957. This study culminated in a public hearing held on December 16th and 17th of that year.

Assembly Bill No. 1912, as it was referred to the committee, would have limited the fee which an employment agency could charge for securing employment for an applicant to 10 percent of the first full month's compensation of the applicant. Assembly Bill No. 2738 would have prevented the payment or deposit of any money to an employment agency prior to the consummation of an agreement between the applicant and an employer for the applicant to commence work as the result of the agency referral.

In addition to matters directly related to the subject of these two bills the committee studied the advertising practices of employment agencies, the operations of trade schools which offer employment opportunities as an inducement to prospective enrollees, the desirability of licensing employees of employment agencies, the form and content of contract receipts and supplementary contracts being used by employment agencies, and discriminatory practices.

The committee submitted a progress report to the Legislature at the 1958 Budget Session setting out in some detail the results of its work at that time and this report was printed in the Assembly Journal commencing at page 397.

This current report is intended to summarize the conclusions resulting from the committee study and finalize the recommendations which appear to be appropriate in relation to the specific items considered by the committee.

FEE LIMITATION

The committee found that 30 states, including California, have no limitations on the amount of fee which may be charged for employment agency service. There was some feeling among applicants that fees charged in the Los Angeles area were excessive. Some witnesses alleged that certain kinds of employment were unavailable except through private employment agencies and that they had no alternative except to pay excessive fees.

Private employment agencies, on the other hand, stressed the competitive nature of their business and contended that competition regu-

lated the fees charged very effectively and that they reflected the actual cost of doing business plus legitimate profits.

The committee found that there was a wide disparity between the costs of private and public employment agencies but that there was a substantial difference in the volume of business and in the methods employed by each. Any legislation limiting the fees of private agencies will have to consider many factors which the limited study by the committee has not thoroughly explored. Among these are the kinds of employment and of applicants, the differences in methods and in volume of business as between agencies, and the social implications of such limitations as well as the economic factors.

As a result, the committee concludes that the particular bill before it, Assembly Bill No. 1912, is not a satisfactory solution to the problem. This is not to say that fee limitations are not desirable in California, but rather that they will have to be based upon carefully documented data so as to correct the inequities of present practices and, at the same time, enable employment agency operators to continue to render their service.

PRIOR PAYMENTS OR DEPOSITS

The practice of requiring prepayment or deposit of fees in advance of placement undoubtedly works a hardship on many applicants for employment. On the other hand, many employment agency operators have felt compelled to adopt this device to protect themselves against the losses resulting from placing short-term transient applicants and from controversies over the amount of fees.

The committee believes that the law should provide a general prohibition against the acceptance of fees or deposits by an employment agency in advance of the placement of an applicant with an exception provided for placement in certain kinds of employment where fee losses and collection problems are particularly acute. It would appear that Assembly Bill No. 2738 could be readily amended to provide such exceptions and with such provisions the committee would recommend passage of the bill.

ADVERTISING

Two major aspects of the advertising problem were considered by the committee. One of these was the misleading characteristics of some employment agency advertising and the problems involved in enforcing regulations designed to protect the public against such unscrupulous activities. The committee concluded that more rigorous enforcement of existing state regulations, combined with efforts on the part of the employment agency associations and advertising media against condoning or accepting false and misleading advertising, could do much to alleviate this problem. The Labor Commissioner was cognizant of the necessity for stricter enforcement of existing regulations and expressed an intention to provide such enforcement.

The other aspect of the advertising problem relates to its amount and cost. Fees under the present no-limitation system in effect in California are presumed to return to the agency operator the cost of doing business, plus a profit. Advertising is a large factor in the cost of doing business. Undoubtedly, if advertising were limited, the cost of doing business would be less and fees could be reduced either with or without

legal limitations being imposed. Whether private employment agencies could render an effective service with less advertising or even with less ostentatious advertising than the committee encountered in the Los Angeles area, is a matter of opinion, but it is suggested that, if substantial support for fee limitation legislation cannot be found, limitations on the amount and cost of advertising might benefit applicants who in the final analysis pay the cost of this advertising through the fees charged.

TRADE SCHOOL OPERATIONS

The committee found that the operation of trade schools which make or imply an offer of employment as an inducement for students to enroll, create serious problems in the regulation of employment agency activities. Most frequently the schools are not subject to regulation by the Labor Commissioner unless such an offer of employment is made or clearly implied and then the commissioner can only require compliance with the employment agency licensing laws. There is virtually no control over the quality of the education or training offered by these schools. Strict enforcement of the licensing and advertising requirements of the law pertaining to employment agencies will help to protect the general public from being misled as to the nature of the services these schools offer but it does not afford a complete answer to the problem of unwary or gullible individuals being victimized by unscrupulous operators.

LICENSING OF EMPLOYMENT AGENCY EMPLOYEES

Under the present law only the proprietors of employment agencies are required to be licensed. The committee found that frequently improper practices and violations of regulations were excused by operators on the grounds that the reprehensible actions were taken by employees without the knowledge or approval of the operators. Owners themselves complained that they were penalized for actions of their employees which they did not have a reasonable opportunity to control. In some instances, persons who could not qualify for a license were, in fact, operating agencies with the license in the name of some more acceptable individual. Employees who had been responsible for violations and been dismissed by their employer were known to have been involved in similar situations with other employers. The solution recommended to the committee by the Labor Commissioner was to require the licensing of employment agency owners, managers, and placement clerks rather than just owners. The committee endorses this recommendation.

CONTRACT FORM

The "contract receipt" form which all agencies are required to give to an applicant for the purpose of informing the applicant as to the amount of fee, terms, etc., was found to be obsolete and inadequate. "Supplementary contract" forms, which contain the actual agreement between the agency and the applicant and which are individually approved by the Labor Commissioner, were not uniform in their provisions. These circumstances have led to a great deal of misunderstanding

and complaint on the part of applicants, as well as complicating the job of enforcing the employment agency regulations.

The committee recommends that the Labor Commissioner adopt a new form of contract receipt combined with a clear and easily understood contract and require the use of this improved form by all agencies.

DISCRIMINATION IN EMPLOYMENT

The committee heard allegations and denials of widespread discrimination in the referral of applicants by employment agencies on the basis of race, creed or color. Inasmuch as there has been introduced into the 1959 Session of the Legislature legislation on the general subject of fair employment practices which covers employment agency practices, the committee makes no recommendation in this regard.

ARTISTS MANAGERS

The committee recognized, at the outset, that the function of artists' managers in relation to their clients differed from the relationship of ordinary employment agencies to applicants for employment and did not study the artists' managers field of regulation. Subsequent to the conclusion of the committee's active work in connection with its employment agency study and investigation, the Artists Managers Guild, which represents persons licensed in this field, submitted a statement setting out the problems which it believes require legislative consideration, together with its recommendations. The committee desires to call this matter to the attention of the Legislature by including the statement of the Artists Managers Guild in its report at this point.

STATEMENT BY ARTISTS MANAGERS GUILD

In 1943, the California Legislature recognized the difference between ordinary employment agencies and artists' managers. The Legislature passed Sections 1650 to 1663, inclusive, of the Labor Code thus setting up a separate category for artists' managers. Unfortunately the separation of employment agencies and artists' managers in certain respects was not completed in 1943. For example "Theatrical Employment Agencies" and "Motion Picture Employment Agencies" as defined by Section 1552 and "Theatrical Engagement," "Motion Picture Engagement" and "Emergency Engagement" as defined by Section 1553 are governed by the sections of the Labor Code relating to commercial employment agencies (Sections 1550 to 1649 inclusive), thus creating a gray area at times conflicting with the provisions of Sections 1650 to 1663, inclusive, relating to artists' managers.

Sections 1550 to 1649, inclusive, of the Labor Code were designed to regulate the ordinary commercial employment agency, whose sole service is to find employment for manual and skilled workers, domestic help and office employees. The service rendered by employment agencies is that of a referral office, entirely commercial in character, and consists of referring applicants seeking employment to potential employers. The work of commercial employment agencies involves no continuing service and the relationship between an applicant for employment and the employment agency is of a very limited duration and is casual in nature.

Moreover, certain provisions applicable to employment agencies are not practical and are somewhat unrealistic when an attempt is made to apply to artists' managers. For example, an artists' manager experiences great difficulty in conforming to the conditions of keeping a register as required by Section 1622 nor can he give a client an employment slip as required by Section 1624 because the artists' manager does not send his clients to prospective employers as an ordinary employment agency for example sends a stenographer to an office to seek employment. The reasons for these impracticable provisions in the employment code is that probably at the time the particular code sections were passed there was no such thing in existence as an artists' manager or if there was, we are reasonably sure that the legislators had never heard of them and never intended such provisions to be applicable to them.

The duties of an artists' manager involve the rendering of highly skilled services of a professional nature under contracts existing for periods of years. The finding of employment is only one element of the service rendered by artists' managers.

Generally speaking, the artists' manager seeks to promote and develop his client's professional career, improve, protect and safeguard the interest of his clients in connection with such clients' relations with purchasers of their performances, and in and about or relating to the clients' various professional activities. This can only be accomplished on a long term basis. An artists' manager may discuss or negotiate with prospective buyers of his clients' services the terms and conditions of the clients' engagement but such discussions are only a part of the artists' manager's function. Perhaps the primary function of the artists' manager, certainly one of his most important functions, is the artists' manager's continuing contractual obligation to counsel and advise such artists with reference to the advancement and promotion of their professional careers. The artists' manager will, for instance, counsel and advise with respect to the advisability of the client accepting a certain engagement, or role, both from the monetary standpoint as well as with respect to the artistic achievement and the possible advancement or detriment to the client's professional career, read scripts and other materials to be performed by the client and make recommendations and suggestions with respect thereto; or if the client has an exclusive contract with a purchaser of talent for a stipulated period the artists' manager is obligated to attempt to seek socalled "loan outs" for the client whereby the client will be permitted to render his services to other utilizers of talents; or when the actor is engaged in motion pictures and is required to go on "location" in other states the artists' manager may be required to go into the other state for personal conferences with the client or with the purchaser of the client's services, or both, in connection with the client's performance; and the same is true of services rendered by the artist's manager when the actor is on personal appearance tours which require the client to travel from state to state. Thus the artist's manager's obligation is a continuing one which does not end with the consummation of an engagement for the client. It is apparent from the foregoing that the artists' manager's services not only protect at all times the interests of their clients in connection with the artists' various performances but

since these artists work throughout the Country, the artists' manager's function also serves to bring to local purchasers of talent and the public, throughout the Country, the services of topflight entertainers.

It is recommended that an amendment be made to the Labor Code which will completely divorce artists' managers from private employment agencies and thus complete the original 1943 intention of setting up a separate and distinct code for artists' managers.

SECTION 4

LIMITING HOURS OF WORK FOR WOMEN

Senate Bill No. 127 and Senate Bill No. 128 (1957 Session) pertaining to limitations in present law of hours of work for women, were also referred to the committee for interim consideration.

It has been alleged that limiting hours of work to eight in any one day and 48 in any one week discriminates against women in "white collar" jobs in businesses subject to the eight-hour law because they cannot be considered for advancement on the same basis as men since they are not available for emergency work and irregular hours frequently required of executive positions. The eight-hour limitation appears to apply on the basis of type of business rather than type of job. The limitations are also said to adversely affect women in seasonal occupations. These limitations are found in Section 1350 of the Labor Code.

This topic has been a matter of legislative concern for an extended period of time. It was the subject of an interim study following the 1955 session of the Legislature by the Senate Labor Committee. That committee reported its findings, conclusions and recommendations to the 1957 Session of the Legislature. Its report ("Preliminary Report of the Senate Labor Committee to the 1957 Session of the Legislature Concerning Senate Concurrent Resolution No. 15, part 1, Office Work Occupations Under Eight-Hour Law") recommended legislation to exempt women in office type jobs from the provisions of Section 1350 of the Labor Code.

The effect of the legislation referred to this committee (Senate Bill No. 127 and Senate Bill No. 128, 1957 Session) is to implement the recommendation of the Senate Labor Committee as expressed in the above report. The committee has carefully reviewed the report and is of the opinion that it fully and adequately supports the recommendations made therein.

During the 1957 Session of the Legislature, the Senate Labor Committee further considered the problem of the eight-hour law for women and issued a report ("Part II, Employments Affected by Eight-Hour Law") in June of 1957. In that report the committee considered the effects of Section 1350 of the Labor Code on such industries as dry cleaning and laundry, transportation, aircraft, manufacturing, and motels, and concluded that it had not received sufficient information upon which to base recommendations for legislation at that time and that further study was necessary of the problems posed by the limitations on hours of work for women *generally*.

The Assembly Interim Committee on Industrial Relations has reviewed this later report by the Senate Labor Committee in conjunction with the earlier report and concludes that while office workers and emergency work should be exempted from the eight-hour limitation a substantial study of the effect of the eight-hour law on women workers generally should be undertaken.

SECTION 5

MIGRATORY LABOR ON CALIFORNIA FARMS

Almost half a century has passed since California first enacted laws to protect the welfare of the men and women who serve as migrant workers on our State's farms.

At the beginning, the Legislature found appalling conditions existing and, in 1913, made the first legislative moves to correct them. Major revisions in the statutes followed in 1919, 1921, 1937, 1947 and 1951.

Over the years many of the faulty conditions have been corrected but major areas for improvement still remain.

After field trips to various parts of the State, public hearings and widespread research, the committee recommends the adoption of legislation that would achieve the following objectives:

1. At the present time the Division of Housing, Department of Industrial Relations, is charged with supervising housing conditions on farms and labor camps that employ five or more workers. The division should be empowered to supervise conditions on farms and in labor camps that house one or more workers. Provisions of state safety laws now apply to camps with one or more workers and similar application should be provided for housing conditions.

2. Added enforcement powers for the Division of Housing, Department of Industrial Relations, in the application of laws, rules and regulations governing the housing of migrant farm laborers.

3. Provision for additional personnel for the Division of Housing, Department of Industrial Relations, to supervise farm labor housing conditions.

4. The institution of some type of educational program among migrant farm laborers of foreign nationality prior to their arrival in California. The committee believes that much of the difficulties experienced by the farmer, the labor camp operator, and the migrant stems from ignorance possessed by the migrant when he arrives in California to go to work. No one briefs him on how to employ modern sanitation facilities, on how to care for his housing quarters, or otherwise to take full advantage of modern accommodations provided for him. Too often, the results of that ignorance are sicknesses and misunderstandings which lead to lost manpower and unfair criticism of the farmer or the labor camp operator who is doing his level best to comply with the law and his conscience.

During this interim period the committee paid especial attention to the problem of housing of migratory farm laborers in California but, at the same time, studied other facets of the migrant labor problem.

The committee found that there is a considerable difference in the treatment accorded American and foreign nationals who serve as migrant farm laborers in California. Most of the foreign migrant farm workers are Mexican nationals but, during the past few years, natives of Japan have been employed in increasing numbers.

Generally speaking, American nationals who work as migrant farm laborers do not receive as much attention or care, or do not receive favored treatment accorded to foreigners who are invited to work on California farms.

No one knows for certain how many farm labor camps there are in California. The State is charged with supervision over those camps accommodating five or more workers. There were 2,000 such camps in 1932, a total of 5,000 in 1950, a total of 7,000 in 1956 and more than 8,000 in 1957. Most of these housing projects are operated by owners of the farms where the laborers work. Where large numbers of workers are employed (sometimes as many as 1,500 laborers) the farmer usually awards a contract to a business firm engaged in that activity to house and feed the workers.

Enforcement and compliance are sketchy and inadequate. There are too many camps and too few state inspectors. Camp operators, in most instances, allow their consciences to be their guides. At the present time there are a total of 29 state fieldmen engaged in checking these camps. But, in addition to those chores, these fieldmen are also charged with enforcing housing laws under the Trailer Park Act; the Auto Court, Resort and Motel Act; the State Housing Act Regulating Apartment Houses, Hotels and Dwellings; and the Earthquake Protection Law, which applies to commercial buildings as well as residential buildings. These fieldmen face an impossible enforcement task and must rely on the co-operation of the camp operators for compliance.

During a recent year peak employment of farmworkers reached a total of about 600,000 employees. Most of them could be classified as the farmers themselves or unpaid members of their families, or year-around paid workers. About 143,000 part-time American nationals were employed, of whom about 105,000 were local residents. "Non-local" workers numbered about 38,000 laborers of American citizenship. (That number was 13 percent *less* than the number for the previous year). "Foreign nationals" in the migratory worker class (mostly Mexican) numbered about 50,000 in 1956. (That number was about 25 percent *more* than for the previous year). During a recent legislative debate on the number of foreign nationals working in the State of California the author of a minimum wage bill stated that 100,000 Mexican nationals were working on California farms during 1957. The steady increase in the foreign farm worker, and the steady dwindling in the number of United States citizens who serve as migratory workers on our farms, is interesting in view of the two types of treatment accorded the foreign and the domestic worker. The United States citizen gets the short end of the stick.

Because of strictly enforced treaties between the United States Government and the Republic of Mexico, satisfactory housing must be provided for Mexican nationals *prior* to their employment. These treaty provisions further provide that Mexican nationals may be removed from any farm where the employee housing standards are below legal requirements. United States, Mexican and California enforcement agencies pay close attention to these treaty provisions because they are agreements between two sovereign nations, because lack of enforcement leads to ill-will between the two nations, and because the Mexican nationals are becoming increasingly important to California farmers

who need their seasonal labor assistance. *The result is that better housing is provided for Mexican nationals than for migratory workers who are citizens of the United States.* This is a bone of contention among labor organizations and other agencies interested in the welfare of the migratory farm worker and the public health and general welfare. One example in the difference in treatment is that, by treaty, Mexican nationals must be fed properly at a cost of not more than $1.75 per day, while contractors may charge Americans on the same job all that the traffic can bear. The close attention paid to the welfare of Mexican nationals has resulted in hundreds of employers of Mexicans constructing dormitories of steel-reinforced concrete with the most modern sanitation facilities and large, well equipped dining and recreation rooms, in order to comply with federal, state and treaty provisions. American nationals benefit by these improved conditions but it is another instance of the tail wagging the dog.

Mexican nationals working on California farms receive favored treatment because of the treaty provisions which protect them. If, for instance, a farm operator does not properly house Mexican nationals, all of them can be withdrawn from the job without a moment's notice to the farmer, thus leaving him bereft of manpower and in danger of suffering the loss of his harvest. The Mexican national is under the protective wing of the United States government when ill or injured, and enjoys the amount and the type of food he demands. The American citizen who works as a migrant laborer does not enjoy that type of protection from his own government.

One of the major difficulties surrounding the farm migrant labor housing problem is due to the seasonal work period. Some labor camps where migrant workers are housed are operated only a few weeks out of the year. Some farmers do not believe it is worth the time, effort and money to bring their housing facilities up-to-date each year. By the time the inspectors have an opportunity to survey them the season is about to close and there is not enough time for the state's agents to go through the legal steps necessary to shut down the operation in an effort to correct the shortcomings.

In some instances, migrant workers benefit indirectly from a recently enacted Federal Tax Law. If a farmer employs migrant housing facilities, between harvest seasons, as storage space for farm machinery, he is allowed to amortize the cost of those buildings over a period of 10 years, instead of over 25 years as formerly provided by federal law. As a result, and because of the average farmer's usual interest in the upkeep of his equipment, many of them are building permanent and excellent structures to house their machinery and, when harvest time arrives, employ them to house their migratory workers.

The committee found that the housing camps of Imperial County are above average for the state. This is partly due to the fact that Imperial County enjoys an almost year-around harvest season and farmers and labor camp operators are financially able to provide suitable quarters for migrant workers, and because most migrant workers are housed in camps operated by caterers or farm organizations who specialize in that type of activity.

The committee was interested in learning that many migratory farm workers, those of American citizenship, prefer to reside in nearby hotels, motels or other types of convenient lodgings.

The American migratory worker as we have known him in the past is disappearing—the single man who works as a migrant farm laborer is practically extinct.

Mostly, the remaining American migrant farm workers travel from harvest to harvest with their families.

There is a strong movement among religious leaders to make provisions for foreign nationals to bring their families with them when they are given contracts to work in California.

The committee was encouraged in noting that, during the last few years, conditions in camps all over the State have improved somewhat due to a number of factors. They may be enumerated as follows:

1. Salesmanship tactics by the representatives of the Division of Housing, Department of Industrial Relations, in stressing among farmers and labor camp operators that compliance is better than law enforcement.

2. The lever of the treaty provisions between the United States Government and the Mexican Government. Farmers and labor camp operators must comply with those provisions or go without the use of Mexican nationals in the harvesting of their crops.

3. California farmers made more money than usual during World War II and have been able to spend more money on housing accommodations for their workers.

4. The provisions of the new federal income tax laws enabling farmers to amortize the cost of storage buildings for their machinery over a period of 10 years instead of 25 years— when they utilize those buildings during harvest seasons to house workers.

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Report of the

INTERIM COMMITTEE ON TRANSPORTATION AND COMMERCE

ON MOTOR VEHICLE AND HIGHWAY PROBLEMS

House Resolution No. 212, 1957

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March, 1959

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LETTER OF TRANSMITTAL

California Legislature, Assembly Interim
Committee on Transportation and Commerce

Sacramento, March 6, 1959

Speaker of the Assembly, and
Members of the Assembly,
Assembly Chamber, Sacramento

Gentlemen: In accordance with the mandate of House Resolution No. 212, Regular Session of the California Legislature, 1957, we have the honor to present a report describing the work of the committee during 1957-58, and the conclusions and recommendations reached.

Respectfully submitted,

Frank Luckel, Chairman
Edward M. Gaffney, Vice Chairman

L. M. Backstrand
Frank Belotti
John Busterud
Charles Edward Chapel
Walter Dahl
Clayton A. Dills
Louis Francis
Myron H. Frew
Leverette House
Vernon Kilpatrick
Lester McMillan
Charles W. Meyers
William Byron Rumford
Charles Wilson

PART I

A. ORGANIZATION OF THE COMMITTEE

The Assembly Interim Committee on Transportation and Commerce met in San Diego on September 6, 1957, to determine the most effective and economical way to handle the work assigned to it by the Assembly Rules Committee and as directed by House Resolution No. 212 of the 1957 Session.

As a result of this conference the committee was divided into six working units and topics were assigned them for study:

A. The Committee As a Whole
   Hon. Frank Luckel, Chairman
   1. San Diego Transit Authority Problems
   2. Station Wagon Licensing Problems
   3. Parking Districts

B. Northern California
   Hon. Frank Belotti, Chairman
   1. Problems of Log Hauling and Allied Topics

C. Bay Area
   Hon. Walter I. Dahl, Chairman
   1. Problems Relating to Freeway Development
   2. Toll Highways and Toll Bridges

D. Southern California
   Hon. Lee Backstrand, Chairman
   1. Metropolitan Area Automotive Smog
   2. Siren Noises
   3. Miscellaneous Motor Vehicle Problems
   4. Highway Markers for Pioneer Routes
   5. Highway Cleanliness

E. Safety Devices and Regulations
   Hon. Edward M. Gaffney, Chairman
   1. School Bus Safety Regulations
   2. Farm-Labor Safe Transportation Problems
   3. Supplementary Brake Devices for Trucks
   4. Reflectorized License Plates

F. Recodification of the Vehicle Code
   Hon. Walter I. Dahl, Chairman

3—L-3987

B. FOREWORD

This report of the Interim Committee on Transportation and Commerce is based, for the most part, upon the testimony of witnesses who appeared before it at the several hearings held in the various parts of the State during the period from November, 1957, to December, 1958. There were nine such hearings covering 10 days of testimony-taking. All hearings were open and were well publicized in advance. No one was denied the right to be heard and every effort was made to obtain the views, both pro and con, from interested persons at the meetings, on related topics as well as on the items on the advertised agenda. Much of the background matter contained in the report was obtained through research.

It will be noted that separate chapters are used to present most of the items contained in the report. This was done so that all pertinent factors pertaining to a topic, background material, findings, and recommendations could be presented in one compact section. Wherever possible, definite recommendations for actions to be initiated have been stated.

PART II

Chapter I

PROBLEMS OF STATION WAGON LICENSING

SUMMARY

A. SCOPE OF THE REPORT

It is the purpose of this study to discover and analyze the problems of licensing station wagons in California and to recommend such changes in the Vehicle Code as will be equable to owners of the vehicles, will assist law enforcement officers in the performance of their duties, and will, at the same time, contribute to the welfare of the State.

B. FINDINGS

1. The use to which the station wagon is being put in California is progressively more and more that of a family passenger vehicle.
2. That the station wagon is still being used by many owners for business purposes and as such is properly registered as a commercial vehicle by the Registrar of Motor Vehicles.
3. That the California Vehicle Code does not now describe or define the passenger vehicle which has become known under the general term, "station wagon."
4. That some traffic law enforcement problems have been caused by the failure to have the word "primarily" inserted in the certificate demanded of station wagon owners as required by the Vehicle Code.
5. That because of the discrepancies noted in paragraphs 3 and 4, above, the California Highway Patrol has frequently been required to make "spot" decisions when issuing citations alleging violations of the commercial vehicle section of the Vehicle Code.
6. That, because of being stopped by the California Highway Patrol, or other law enforcement agencies, station wagon owners have frequently been embarrassed and sometimes given traffic violation citations when they were, in fact, not using their vehicle for illegally transporting property. In these cases, those who contested their arrest were usually exonerated by the court having jurisdiction of their case. They were, however, subjected to inconvenience and unnecessary expense.
7. That some owners of station wagons choose to pay the additional weight fee in order to obtain commercial license plates, even though they do not use their vehicle for commercial purposes. This procedure is discouraged in some communities. In Sacramento, for instance, city ordinances exclude station wagons from parking in commercial zones.

8. That the number of station wagons registered in California was approximately 450,000 on December 13, 1957. This figure was expected to be augmented by at least 100,000 in the registry year 1958—thus increasing the problem confronting station wagon owners and the Highway Patrol.

C. RECOMMENDATIONS

It is recommended that the California Vehicle Code be amended as follows:

1. To properly define a station wagon.
2. To modify station wagon registration regulations to the end that it will no longer be necessary for the California Highway Patrol or other law enforcement officers to be responsible for determining the legal status of such vehicles when they are used for the transportation of property and/or passengers.
3. To insure that any amendment to the code designed to effect the results noted in paragraph (2) above does not result in an excessive financial burden to individual station wagon owners nor loss of revenue to the State.

D. BACKGROUND OF STATION WAGON LICENSING PROBLEMS

The problems which confronted the committee in determining a fair and proper license fee (or fees) for owners of station wagons were complex.

Historically the station wagon to some extent supplanted the horse-drawn farm wagon as a means of transporting produce to market and manufactured necessities to the farm. Or it was used by small business firms for delivery purposes. It was essentially a small commercial vehicle although it was, to some extent, used as a family passenger vehicle.

The station wagon, as it was first designed, bore little resemblance to the present-day vehicle. It was designed and built to carry merchandise rather than people. It usually had just one seat and two doors in front. For ease of loading, it had doors at the rear which usually opened in such a manner as to permit full use of the body capacity. It was made of wood panelling over a steel frame. It usually had windows, some of which were removable.

For the past several years, especially since World War II, marked changes have occurred in the design of station wagons. These body-design changes have been brought about, largely, by the demands of the car-buying public. Our people have undergone at least two major changes in their way of life in this period. These changes have vitally affected their transportation needs.

In the first place, since 1940 there has been a trend toward larger families, particularly by the generation that fought in or helped produce the material required for the successful consummation of World War II.

There has been the movement of population from rural to urban areas as a result of more concentrated industrialization. Also, many families migrated to new homes in new localities in the search for better working and living conditions.

Although World War II and the Korean affair have been concluded for several years, there has lingered on a feeling of optimism which has produced the continuing rash of early marriages, relatively large families, and the restlessness which has caused our population to remain largely in a fluid state.

Thus families have packed their belongings into their inadequate family cars and have moved to some other more desirable part of the Country. Many have come to the Pacific Coast states. California, because of its splendid climate and many economic opportunities, has been the focal point of much of this westward movement.

The automobile builders, alert to the changing needs of the buying public, quickly redesigned the station wagon to meet those needs. Now it is a beautiful passenger vehicle capable of carrying family groups of eight or more persons. By folding out of the way or removing some of the seats, property-carrying space can be greatly increased.

Some models of the station wagon have been designed to meet the requirements of certain businesses whose owners use them as a type of commercial vehicle for which commercial licenses are required (if they come within the 3,000-pound weight minimum).

With the changes in design and because of their beauty, utility and riding comfort, the station wagon has become a truly dual-purpose vehicle. Their popularity in California is evidenced by the fact that at the end of 1957, approximately 450,000 of them were registered in the State. The Registrar of Motor Vehicles forecasts a total registration of 600,000 by the end of 1958.

The sale of station wagons is now more than 20 percent of the total sales of new automobiles in some California counties including the San Diego area, according to testimony heard at that place. Of the new station wagons sold, only one commercial license, to 30 passenger car licenses, was issued to these vehicle owners. This differential between commercial and passenger car licensing for station wagons does not vary greatly from the norm for the entire State.

E. PROBLEMS OF STATION WAGON LICENSING

As stated above, the number of station wagons on California's highways has increased rapidly until there are now about 450,000 registered. Approximately 600,000 are expected to be licensed in the State by the end of 1958.

There are two major problems in connection with their registration which are not adequately resolved in the California Vehicle Code. One is the proper definition of the modern station wagon, the other is the determination, for licensing purposes, of the end use of which the vehicle will be put by the purchaser: family or commercially for hire.

The first of these problems is relatively easy of solution and has not, of itself, caused embarrassment to the owner, or to the state agencies involved in registration or enforcement. But the second problem has often caused confusion, irritation, inconvenience, and unnecessary financial hardship for the owner, and has put undue responsibility upon the California Highway Patrol in that they have frequently been called upon to make "spot" decisions when issuing citations to motorists who allegedly were violating the commercial vehicle section of the Vehicle Code. The patrol officer, in these instances, has been required to decide,

on the basis of the contents of the station wagon at the time of the arrest, whether or not the owner was in violation of Section 372(a) of the code. A portion of this section is as follows:

> "In addition to the registration fee specified in Section 370, there shall be paid fees as set forth in this section for the registration of every vehicle of a type subject to registration used or maintained for the transportation of persons for hire, compensation or profit or designed, used or maintained *primarily* for the transportation of property."

In testimony before this committee it was affirmed that there have been numerous instances of citations being issued for alleged violations of Section 372(a) when the owner was carrying trash from his yard to a dumping area or packages to his home in his family station wagon. This type of hauling, it was stated, could have been done in any other type of family vehicle without attracting the attention of the Highway Patrol. Although the court may have found the station wagon owner to have been "not guilty" of any violation he was nevertheless, subjected to uncalled-for inconvenience, hardship, and, oftentimes, expense.

Some confusion and irritation, too, has resulted from the wording of the affidavit required by the Department of Motor Vehicles from purchasers of station wagons, it has been noted.

A majority of the witnesses before this committee, representing large groups of station wagon owners, civic groups, and motor car dealer's associations testified in favor of amending the Vehicle Code so as to properly classify the station wagon as a family vehicle unless it is used primarily for business purposes.

The representative of the California Highway Patrol expressed the desire to have the Vehicle Code amended so that there would be no responsibility on the part of the patrol or other law enforcement officers for determining the legal status of station wagons when they are used for the transportation of property and/or passengers.

The Registrar of Motor Vehicles, with the efficient operation of his department and the financial interests of the State in mind, offered several alternative plans for legislation which would protect station wagon owners from the embarrassment of arrest by the California Highway Patrol, or other law enforcement agencies alleging illegal use of their vehicles while carrying property. These, briefly, are as follows:

1. That the Vehicle Code be amended to adequately describe a station wagon as a family passenger car or for commercial purposes such as carrying persons and/or property for hire—and that owners certify the use for which they are registered. Only those who will use them primarily for commercial purposes would be required to pay the commercial fee. This change would not entirely solve the problem because owners might be questioned by law enforcement officers concerning the contents of their vehicle, but would be eminently fair to all station wagon owners.
2. To require all station wagon owners to pay weight fees. This, of course, would increase the State's revenue, but would be unfair to the approximately 97 percent of the owners who do not use their vehicle commercially.

3. To take the weight fee registry provision from all station wagon owners. This would result in the loss of approximately $450,000 per annum to the State.
4. To charge all station wagon owners a nominal additional fee to insure the State at least $450,000 per annum. Under this provision no owner would be required to pay weight fees.

F. ACTION TAKEN BY THE LEGISLATURE

In the First Extraordinary Session of the California Legislature in 1958 alternate choices were offered for consideration by the Legislators. These were Assembly Bill No. 9, introduced by the Chairman of the Assembly Interim Committee on Transportation and Commerce, the Honorable Frank Luckel et al. The other, Assembly Bill No. 22, was introduced by the Honorable Carl Britschgi et al.

The intent of Assembly Bill No. 9 was to redefine the station wagon so as to clearly show the dual purpose of that automobile as a family-use vehicle which would only incidentally be used for commercial purposes. Those vehicles which were to be used or maintained primarily for transporting passengers for hire, or primarily for the transportation of property, would be required to pay the additional fees required by Sections 372 and 372.1 of the Vehicle Code; those used as family passenger cars would not be subject to additional fees upon registration. It was recognized that this proposed amendment would not radically change the existing registration provisions of the Vehicle Code, but the representatives of both the Department of Motor Vehicles and the California Highway Patrol testified that it would be an improvement over existing regulations and could be enforced without placing undue hardship on law enforcement officers. It was considered by the majority of the committee to be the fairest solution to the problem in that it would not require additional cost to family-use owners of station wagons. This bill was rejected by the Senate in favor of Assembly Bill No. 22.

Assembly Bill No. 22, introduced by Assemblyman Carl Britschgi et al., abandons the concept of registration fees being based on the use to which the vehicle is to be put—that is, to charge passenger car rates for family-use station wagons, while requiring that weight fees be paid where the vehicle is used in commercial activities—in favor of applying an additional charge of one dollar ($1) for all station wagons registered in California. Only those vehicles used or maintained for the transportation of persons for hire would have to pay additional weight fees as required under Sections 372 and 372.1 of the Vehicle Code. However, under this bill any station wagon owner may obtain commercial license plates for his vehicle by electing to pay the appropriate registration fee.

It was claimed by the supporters of Assembly Bill No. 22 that the benefits accruing to all station wagon owners and the ease of administering and enforcing its provisions justified the one dollar ($1) additional registration fee. The State of New York, it was said, has a similar law.

Chapter II

PROBLEMS OF HIGHWAY MARKING TO DESIGNATE ROUTES FOLLOWED BY THE PADRES AND EMIGRANT PIONEERS IN CALIFORNIA

A. SCOPE OF THE REPORT

It is the purpose of this report to review the many requests that have been made to place suitable markers on California highways to designate the routes followed by the Spanish Padres and the early American emigrants.

An effort will be made to analyze the problems presented by these requests and to make recommendations aimed toward their solution.

The pioneer routes for which markers have been suggested are:

The Mission Bell Route of the Padres (El Camino Real);
Emigrant Trails;
The Overland Mail Routes;
The Pony Express;
Cabrillo Freeway.

B. BACKGROUND OF THE REPORT

1. The Mission Bell Routes of the Padres (El Camino Real)

When, in 1767, Don Carlos III of Spain directed his Viceroy in Mexico to send a force into Alta California for the purpose of establishing his claims to that territory, Don Portola was appointed to be the military leader and Franciscan Father Junipero Serra the missionary and spiritual advisor. The Franciscans had just come into their own in Mexico after the expulsion of the Jesuits by the King for alleged treasonable acts. This was the inception of the project which ended in 1823 when the mission in the Valley of the Moon, San Francisco de Solano de Sonoma, just north of San Francisco Bay was completed. In all, 21 missions were built. The first, the Mission San Diego de Alcala was ready for occupancy in 1769, just two years after the expedition left Mexico. Later many Asistencias, or outpost missions, were added to the main religious and cultural centers as need arose.

For the purpose of protecting the territorial interests of the King of Spain, four forts or presidios were built concurrently with the missions. The Presidio of San Diego was completed in 1769, that of Monterey (the capital) in 1771, San Francisco in 1776, and Santa Barbara in 1786.

The road between presidios was usually called by the Spanish builders, "El Camino Real" which translates, "The Main Road," or "The Principal Highway." Probably because the presidios in California, and their connecting highways, were built by direct order of the King of Spain, El Camino Real has in California been erroneously translated, "The Royal Road" or "The King's Highway."

Regardless of how the original Spanish name is translated, enough historical romance was built into this great project of missions, presidios, the highways, stretching more than 500 miles from San Diego to Sonoma, and spanning more than half a century of hardship, toil, and accomplishment, to justify recognition by this generation of its value to California.

Spain was never allowed to realize on her venture in Alta California, for Mexico gained her independence from the Mother Country in 1821, two years before the completion of the last mission. It was in 1846 that California was freed from Mexico and then entered the Union as the thirty-first state in September, 1850.

More than 50 years ago an effort was made to capture the historical romance of the missions for the traveler on California's highways, when in 1906 Mr. and Mrs. A. S. C. Forbes designed and copyrighted markers in the shape of mission bells to be placed along the "Route of the Padres." An El Camino Real Association was formed by these people and contributions were solicited from many sources to provide funds to finance the project. It was the intent to place a bell at approximately each mile of the route. A great many of those bells were installed along Highway 101, as anyone who traveled that road in the early 1920s can attest.

Mr. Forbes turned over the job of maintaining the bell markers to the combined efforts of the California State Automobile Association of San Francisco and the Automobile Club of Southern California in 1921. Then, in 1933, the State Highway Department was assigned the responsibility for placing and maintaining all signs and markers along the highways of California. By that time many of the Mission Bell markers had disappeared.

2. *The Emigrant Trails*

Next in point of time was the movement of emigrants who came via oxcart and wagon train from the Mississippi Valley and the more western areas of the settlements to seek new homes in California. No mention is made here of those eastern seaboard emigrants who came by boat, around Cape Horn, or by way of the Isthmus of Panama. But this concerns those pioneer folk who were spurred on by the discovery of gold in January, 1848, to go west to seek their fortunes in California. These were the people who joined the Emigrant Trains in their Conestoga Wagons, which have been called "Prairie Schooners" and came to this Land of Promise. It has been said that without those broad-wheeled covered wagons it would have been impossible to travel across the river bottoms, prairies, and deserts, that marked the way west. They have become the symbol of the emigrant.

3. *The Overland Mail Routes*

With the rapid growth of California after the discovery of gold in Sutter's Creek in 1848, the need for faster and more dependable transportation between the settlements and the business and banking centers of the East became evident. The water routes around Cape Horn, or by way of the Isthmus of Panama were not speedy enough for business communication.

As a result the Congress in March, 1857, enacted a law authorizing the licensing of the Overland Mail Service. In that same year, 1857, regular stagecoach service was inaugurated between San Antonio, Texas, and San Diego, California. Then on September 15, 1858, the Butterfield Overland Mail left Memphis, Tennessee, on its initial trip to San Francisco via St. Louis, Missouri; Gila River, Arizona; Ft. Yuma, Los Angeles, Ft. Tejon, Visalia, Firebaugh Ferry, and Pacheco Pass, California. More than one-fourth of this Overland Mail Route was within the borders of California.

This and other stagecoach lines offered fairly dependable service for mail and passengers between the Missouri River and California until the Civil War reduced the service and the transcontinental railroads finally ended the project in 1869. Mark Twain, in his informative tale, *Roughing It*, caught the spirit of hardship, adventure, and romance that attended those who traveled to the Far West via the Overland Mail. Those coaches offered the traveler a modicum of comfort and safety and represent that phase of transportation to all who see them.

4. The Pony Express

The Pony Express was a mail-carrying venture which began in April, 1860, and ended in October, 1861, with the coming of the telegraph. Its eastern starting point was St. Joseph, Missouri, and San Francisco was the western terminus. In *Roughing It*, Mark Twain tells of the perils and hardships encountered by the daring riders and their sturdy mounts during the brief period that this mode of mail delivery service was in operation. The cost of sending mail by the Pony Express was almost prohibitive even for those lush times. The rate for sending letters or small packages from New York to San Francisco was $5 an ounce. No wonder the telegraph supplanted this form of communication.

All of these historical episodes have been honored in song and story, but very few travelers over our highways are aware of the existence of the scenes of high adventure so near at hand. How many would stop to become better acquainted with the facts concerning them is not known, but historians and others interested in California's romantic beginnings believe that they should have the opportunity to do so.

This centennial year, 1958, of the Overland Mail Service brings into focus the need for more recognition by Californians—native or adopted—of the historical romance attached to the past's unfolding progress of transportation and communication within the borders of their State to which they are heirs. Beginning with the padres and soldier-builders from Mexico in the Eighteenth Century and continuing almost uninterruptedly through the Nineteenth and into the Twentieth Century, the allure of gold, climate, agriculture, and industry brought swift changes in the manner of travel: foot, oxcart, covered wagon, stagecoach, pony express, railroad, automobile and airplane.

The romance and historical significance of California's transportation development has been caught and efforts have been made to share the adventuresome spirit of those early travelers with all visitors within our borders.

As stated above, a start was made to use highway markers to call the attention of the passing motorist to an historical travel route when in

1906 mission bells were installed along El Camino Real—what is now U. S. Highway 101.

Many years ago civic groups, historical societies such as the Native Sons and Daughters of the Golden West and the Daughters of the American Revolution, garden clubs, as well as some local governmental agencies undertook to raise funds to erect plaques or monuments to mark the sites of historical events which have made California history. The first of such sites to be officially registered was the old Custom's House in Monterey. This was done in 1931.

These were worthy undertakings and served a useful purpose. But it was not until 1949, when the Legislature enacted into law a measure establishing the Office of State Historian that a central agency was available to correlate the many historical background data and to authenticate the times and places where past events occurred and to determine which were worthy of memorialization. By worthy is meant those occurrences which justify the expenditure of the limited funds which are available and does not imply that one event was more important than another.

The feasibility of using markers along our highways to inform the traveling public of the location of points of historical interest has not been completely demonstrated.

Some of the major problems to be solved are:

1. Cost;
2. Protection from theft or vandalism;
3. How to place markers along our highspeed highways so that they can be seen by the passing motorist and the information obtained from them without creating another traffic hazard.

Most of the direct testimony received by this committee had to do with the placing (or replacement) of mission bells along El Camino Real.

The Reverend Anthony Soto, who represented the Franciscan Fathers of California, stated that more than a million tourists visit California's missions each year. He further stated that they are one of the 10 most popular attractions in California.

Mr. Ralph Buffon, Manager of California Mission Trails Association, suggested that as a practical and economic consideration, markers should be located at points of entrance to and departure from the major communities along the part of U. S. Highway 101 that parallels the original El Camino Real. This suggestion could be used for marking other historic routes and/or events that occurred on or near other California highways.

It was also suggested that the location of historic points of interest, together with directions for getting there be made a part of California's roadside rest station planning as that program develops.

Mrs. James P. Lanehart, Past Regent of El Camino Real Chapter, Daughters of the American Revolution, and Chairman of the Committee on Restoration of Mission Bells, was one of several witnesses who represented historical groups favoring the restoration of markers along El Camino Real. She called attention to the statewide interest in such a program.

Mr. Granis P. Parmelee, Manager of the Sign Services Department, Automobile Club of Southern California, testified that although the mission bell symbol of El Camino Real was copyrighted, that copyright would expire in a few years so that the State should encounter little delay in obtaining authority for using them, if and when permissive legislation were passed.

Mr. Parmelee pointed out, however, that highway markers, such as the mission bells to symbolize the highway of the missions, might prove ineffective because the high speed of automobiles along the freeway would make it difficult for travelers to observe them.

C. FINDINGS

1. That California history abounds in romantic episodes connected with the unfolding pattern of transportation within its borders. From the first footpaths traveled by the padres, through the oxcart, covered wagon and pony express, to the modern automobile and airplane, travel methods have developed as the need for change has arisen.

2. That many organizations, local and statewide, desire to have markers placed along U. S. Highway 101 to invite the attention of travelers from in and out of state to the historical background of this route of the padres and the sites of the missions they built.

3. That requests have been made to have suitable markers installed along appropriate highways to symbolize the other forms of travel in the early days of California.

4. That there is much sentiment in support of providing roadside markers to call attention to all important events in the history of California.

5. That suggestions have been made that designs be planned for markers which will be used to symbolize the several modes of travel:

a. El Camino Real—Mission bells;
b. Emigrant trails—Conestoga wagon;
c. Overland mail—Stagecoach;
d. Pony express—Pony and rider.

6. That some opposition exists to placing historical markers along the highways for the following reasons:

a. Initial cost;
b. Losses due to vandalism and theft;
c. Traffic hazards because of distraction of motorists' attention;
d. Not practical because speeding motorists will not understand their import if they see them.

7. That the portions of U. S. Highway 101 which comprise the coastal highway of California from the southern boundary of San Diego County to Las Cruces in Santa Barbara County are now designated "Cabrillo Freeway." Appropriate signs have been placed thereon by the State Division of Highways. If this route becomes designated "El Camino Real," those signs will have to be removed.

D. RECOMMENDATIONS

1. That the Division of Highways co-operate with state historical societies and the Beaches and Parks Division so that appropriate symbols be devised for use as highway markers, if their use is approved.

2. That consideration be given to placing highway markers along U. S. Highway 101 where it parallels the route followed by the padres when California's missions were built. Also, if funds become available, that markers be placed along other highways which were the routes of other historical methods of transportation, including the emigrant trails, the overland mail routes, and the pony express.

It is recommended, as a compromise measure if it is determined not to be feasible to mark our highways in such a manner that travelers are made aware of the location of historic places and events, that consideration be given to one or more of the following alternative plans:

a. Present all visitors to California a brochure showing the location of historical places and events with a brief description of what took place. Simple directions for getting to them should be included. Symbols indicating the El Camino Real, emigrant trails, routes, etc., should be placed on the pamphlet.

b. If direction signs are not used, place symbols at stated intervals along the highways. These symbol markers could be replicas of mission bells, Conestoga wagons, stagecoaches, or pony and rider as appropriate.

c. If neither (a) nor (b) are found to be acceptable compromises, then it is suggested that legislation authorizing the co-ordination of the roadside rest stations with markers and directions to nearest historical places, etc., should be introduced at the proper time.

Chapter III

PROBLEMS OF HIGHWAY CLEANLINESS

A. SCOPE OF THE REPORT

The prevention or control of highway littering is an important problem on all routes of automobile travel in California. It is a particularly difficult one on those heavily traveled thoroughfares that spread out from metropolitan areas. It is the purpose of this report to analyze the many suggestions which have been made to curb the throwing and/or depositing of trash along the highways and to suggest legislation—or other alternative means—designed to bring about control of the problem and make California a pleasanter and more beautiful place to travel in.

B. FINDINGS

1. That California's highway cleanliness problem is greatly complicated and augmented by some of the following factors:

a. An unusually equable and relatively dry climate which is conducive to year-round highway travel.
b. This dry condition tends to preserve the discarded debris which accumulates along the roads rights-of-ways.
c. California now has registered in excess of 7.5 million automobiles—more than any other state—a figure which represents over 10 percent of all motor-driven vehicles in the United States.
d. Distance between points of travel are great, which influences the tendency for travelers to carry lunches which they eat along the route of their journey.
e. A lack of adequate trash disposal facilities along the highways.
f. The large numbers of out-of-state tourists who visit this State.
g. The thousands of farm laborers from below the border, many of whom cannot read or understand the "No Dumping" signs.
h. A general tendency on the part of many persons who use our highways to negligently or willfully throw waste papers and other material from their cars, or dump garbage along the right-of-way.

2. That Section 600.6 of the Vehicle Code specifically declares it to be unlawful to dump garbage, papers, etc., on public highways or roads.

3. That signs warning the traveling public of this prohibition are posted along California's highways and freeways.

4. That the enforcement of the California anti-litter law (see paragraph 2 above) presents almost insurmountable problems, due to limited traffic enforcement personnel and the difficulties encountered in arresting and convicting offenders.

5. That a recommendation has been made to have the California Legislature amend the present anti-litterbug law so that whenever a violation occurs it shall be presumed that the registered owner of the

vehicle committed the violation. This presumption to be subject to rebuttal in court. This amendment would lessen the difficulty of enforcement, it was alleged.

6. That Los Angeles County now spends in excess of $6 million a year on park and roadway cleanliness.

7. That recommendations have been made to have rewards for information leading to the arrest and conviction of the litter-law violators be offered (Los Angeles County now has such a law and offers a reward of $50 for informers).

8. That California adopt a slogan to remind drivers of the need for highway cleanliness, "Parky the Kangaroo" and the "Litterbug" were suggested.

9. That a program of education to curb litter-bugging beginning with high school driver-training be instituted in California.

10. That the problem of highway cleanliness is a nationwide problem and California should gear its program to any national program which may be adopted, in a manner similar to the "Smoky the Bear" slogan project which has been effective in reducing forest and grass fires along our highways.

11. There is some evidence to support the belief that the rapid urbanization of fringe metropolitan areas has outdistanced garbage and trash disposal in many instances. Lack of this service—or excessive charges for it—has tempted many of our citizens to thoughtlessly dump their surplus refuse along nearby roads.

12. That there is some evidence that the removal of the backyard incinerator in the Los Angeles area has contributed to "dumping" at dead-end streets and elsewhere in that vicinity.

13. That highway cleanliness is implicit in the federal aid program for the Interstate Highway System.

14. That there is some question as to the effectiveness of present anti-litter warning signs because of the fast travel on our freeways and driver-diversion caused by advertising billboards in many areas.

C. BACKGROUND OF THE REPORT

Several factors have contributed to the complexity of the problem of controlling litter on California's highways, not the least of these being California's equable and temperate year-round weather. Nearly all of our State lies within the zones of Mediterranean climate which gives us warm dry summers conducive to all forms of outdoor activity, including road travel to our beaches and parks. This mild, dry, summer weather is partly responsible for the large numbers of out-of-state tourists who find California a Mecca they visit again and again before they become permanent residents. What rain we have is largely restricted to a few winter months. This winter weather does not hamper wintertime travel.

Our dry summer climate, which is found in almost the entire State, has but one drawback insofar as road cleanliness is concerned. Every piece of paper, every bit of garbage and all the cans and bottles which are carelessly dropped from cars or are deposited along the roadsides stay there and accumulate until someone picks them up and carries

them away. Whereas in most states the rainfall is sufficient to produce grass or weeds to hide the debris or to cause the paper to disintegrate, this does not usually happen in California.

Because of the rapid expansion of urban developments into rural areas adjacent to many of our larger cities, adequate trash and garbage disposal service has either lagged behind the population growth or the cost has been considered excessive by many residents of those new communities. They will avoid the high cost of collection by loading their trash accumulation into their automobiles and dumping it along the road in some lonely spot.

Our transient labor force is another source of highway litter. These people, mostly from Mexico, travel with their families in their cars and usually camp and eat along the highway. Because of inability to read or understand the "no dumping" signs, they often leave their surplus food scraps, cans, and other debris behind to be blown about and accumulate until it becomes an eyesore to all who use our roads.

But there is no one group, or groups, of travelers who are, by themselves, the source of highway litter. There is a general tendency toward thoughtlessness or carelessness by persons in all groups of our population when they are on the road in their automobiles. The result is that trash has accumulated to an enormous degree along our highways and rights of ways.

So it devolves upon all of us in California to be alert to the need for preventing the accumulation of litter on the one hand and for the proper disposal of it on the other. We can all carry litter bags in our cars and dispose of its contents when we stop for gasoline along the route of travel.

D. RECOMMENDATIONS

Experience has taught that laws by themselves are futile where well established habits are involved. Los Angeles County is a pioneer in the field of prevention and policing of litter on its streets and highways and in its parks. The county annual budget for its project of park and highway cleanliness is in excess of six million dollars and it has been growing steadily since it was first inaugurated.

Los Angeles County officials have found that the use of the slogan, "Parky the Kangaroo," has been useful to promote cleanliness. They have supplemented this slogan by offering a reward of $50 for the arrest and conviction of violators of their antilitter law.

But with all the money spent for personnel and equipment to police their roads and parks they have found that best results have come from their educational programs. As Mr. Fred G. Fimbres, Chief of Los Angeles County Sheriff's Department, stated it: "Should this new law go into effect" (amend the present antilitter law so as to presume that the registered owner of the vehicle committed the violation) "we would certainly engage in a very extensive public relations program with at least a 30- or a 60-day-wide publicity. The press has been extremely helpful on these matters and just as the question was asked a moment ago, 'what progress have we made on that now'? I started to throw the wrapper off my cigarette pack out of the car and my four kids jumped on me as though I'd been selling secrets to the Russians. * * * I think

its value will be in its deterrent effect * * * and give us a little bit more to work on because of the responsibility."

The committee recommends as follows:

1. That no actions be taken during the 1959 Session of the Legislature to take up any measure which would presume that the owner of a vehicle was the violator when trash was thrown from it onto the highway.

2. That the State Board of Education be memorialized by Assembly Resolution to include antilitterbug education in its driver-trainer program.

3. That the Motor Vehicle Department be memorialized by Assembly Resolution to include antilitterbug educational material in every driver's license examination.

4. That the Division of Highways, Public Works Department, be memorialized by Assembly Resolution to re-evaluate its antilitter sign program to assure its ultimate effectiveness.

5. That the Divison of Highways, Public Works Department, be memorialized by Assembly Resolution to co-operate in every way practicable with such organizations as the State Garden Clubs, Keep America Beautiful, Inc., the California Roadside Council, as well as many other groups who are interested in promoting roadside cleanliness on a state and nationwide basis.

6. That the newspaper publishers of California be thanked by Assembly Resolution for the part they have played thus far in promoting highway cleanliness and assuring them of the Legislature's co-operation in promoting any future antilitterbugging campaigns.

Chapter IV

PROBLEMS OF RAPID TRANSIT SYSTEMS IN CALIFORNIA

A. SCOPE OF REPORT

It is the purpose of this report to review the problems of transit systems in California and to determine what steps, if any, can be taken—in view of declining revenue—to assist them out of their financial difficulties. It is not the intent of this study, however, to go deeply into the complex financial problems which face the privately owned transportation corporations in California. It is intended, however, to carefully review testimony offered the committee and to recommend such legislation, including any further studies as may be deemed advisable with the view to effecting such immediate and long-range tax relief as may come within the scope of this committee and the power of the California Legislature.

B. FINDINGS

1. That since World War II there has been a reduction in the net earnings of transit companies due, it has been stated by transit system witnesses, to increased taxes, increased wages, and increased prices of materials—coupled with declining revenue.

2. That considerable evidence is available to support the contention of decreased revenue, based on declining patronage, for the following reasons:

a. Passenger automobile registration has kept pace with the California population growth for the period 1950-57 (an increase of about 73 percent), whereas licenses issued to passenger buses used by transit companies has declined by 14 percent during that time.

b. Less than 12 percent of passenger travel to and from the downtown district of at least one large California urban area was handled by transit facilities.

3. That some reduction in passenger patronage may be due to a decrease in transit mileage.

4. That during the same period since World War II, private transit systems have increased their passenger fare rates on an average of more than 100 percent in an effort to bring income in line with increased operational costs. This increase may have contributed to some of their loss of patronage.

5. That mass transit is essential to a community as a solution to downtown traffic congestion problems.

6. That the transit industry has done much to stem the decline in revenues which began after the end of World War II. Some of these have been to—

a. Establish better public relations programs to inform potential transit users of the nature and availability of service.
b. Lessen travel time wherever possible.
c. Improve passenger comfort by providing better lighting, wider seats, better ventilation, and smoother-riding vehicles.
d. Renew emphasis on driver safety and courtesy.
e. Decrease bus failures by better maintenance practices.

7. That the industry asserts it is overburdened with taxes and overly restricted by state regulations.

8. That the transit companies state that there is an undue time lag where rate increases are requested which contribute to loss of revenue.

9. That transit systems believe that action should be taken by the Legislature to relieve the financial burden they are forced to carry in the form of excessive taxes, vehicle weight fees, etc.

10. That in some areas, notably in San Diego, where hearings have been held, there is strong opposition to resolving the financial problems of the privately owned transit system by sale to a publicly owned corporation. Some reasons advanced were:

a. A publicly owned corporation, allegedly, would not be run efficiently.
b. It was stated that ultimately, the taxpayers of the area would be called upon to help finance a publicly owned transit system if one were established.
c. That any large publicly owned transit system would eventually extend its service to adjacent areas and absorb into its organization all privately and publicly owned transit companies, already in operation.

11. That the Mayor of the City of San Diego has appointed a Metropolitan Transit Fact Finding Committee with authority to make a thorough study of the transportation needs of that area and report its findings upon completion of the project. This report is to be available early in 1959.

C. RECOMMENDATIONS

It is the sense of the Interim Committee on Transportation and Commerce that privately owned transit systems in California are facing the probability of extermination in the not too distant future because of the continuing two-pronged nemesis of increasing operating costs on the one hand and declining revenue on the other which has beset them since the end of World War II. Mr. Don Hansen of the San Diego Transit System called attention to Chapter 2404 of the Statutes of 1957 which declares it to be a matter of legislative policy that privately owned passenger stage corporations, as defined by Section 226 of the Public Utilities Code, should have the opportunity of earning a return of at least 6½ percent net of gross operating revenue after all taxes properly chargeable to transportation operation, including but not limited to income taxes.

It is recommended, therefore, as a long range project that a resolution be presented to the 1959 Session of the Legislature to have a special interim committee appointed and directed to study and report on

the financial problems of privately owned transit systems. Some suggestions made by Mr. Hansen, and others, designed to alleviate the adverse financial condition of privately owned passenger stage corporations, and which should be considered by any fact-finding group appointed to make the study are:

1. Reduce time lag in rate increase when allowed by the Public Utilities Commission.
2. Develop a more equitable method of determining passenger fares by the Public Utilities Commission. (Note—Items 1 and 2 are under the control of the Public Utilities Commission.)
3. Bearing in mind that the operations of transit corporations are inevitably interwoven with the public interest, consideration should be given as to who should finance, direct, and/or operate the systems.
4. To follow up on subparagraph 3, above, determination should be made as to whether or not mass transportation facilities should remain under control of the agencies, governmental or private, presently operating them.
5. In long-range planning, and where the general community interests warrant, should existing privately owned transit systems be subsidized by the community or communities served? If the answer is yes, to what particular phases of operation should the subsidies be applied?
   a. To establish park-ride facilities at one or more locations with express service to downtown or other concentrated areas such as large industrial centers?
   b. To underwrite the extension of transit routes into newly developing residential and industrial areas?

In order to afford immediate relief, it is recommended that the 1959 Session of the California Legislature adopt legislation to:

1. Reduce the annual weight fees required by Section 372 of the California Vehicle Code from $160 to $50.
2. Exempt diesel fuel used by transit-operated motor vehicles from the 3 percent state sales tax.
3. Increase the weight tolerance on rear axle loading to permit the use of standard 51-passenger transit coaches instead of the so-called "California" 48-passenger vehicles now authorized. This additional 10 percent increase in rear axle tolerance would permit a 6 percent increase in passengers carried, it is alleged.

The above suggestions by no means cover all possible topics, but are representative of the requests for assistance that have been presented to this committee. The committee established by the house resolution should have wide latitude in the selection of its agenda and should be provided with adequate funds to enable it to obtain the specialized expert assistance necessary for it to attain its objectives. The report required of the special committee should contain definite recommendations for legislation designed to assist privately owned transit systems in every way possible.

The financial troubles in which privately owned transit systems find themselves is real and pressing, but is not restricted to the State of California. In its report, issued as of June 1, 1957, the American Transit Association lists more than 350 instances of relief from taxes of various sorts that have been granted to transit lines—public and privately owned—throughout the United States since 1947. In 1955 alone, the number of relief actions approved totaled 49; for just a fraction of the calendar year 1957, the number was 21.

For a summary and description of the types of relief awarded in the fractional year 1957, see Appendix A-1.

Chapter V

PROBLEMS OF HIGHWAY SAFETY: SCHOOL BUS SAFETY

SUMMARY

A. SCOPE OF THE REPORT

It is the purpose of this study to review and analyze the problems of highway safety—particularly as they relate to the transportation of children to and from school—and to recommend such changes in the Cailfornia Vehicle Code as may seem adequate and proper for their protection.

B. FINDINGS

1. That school buses, other than those engaged in transporting public school pupils to and from a public school or to and from public school actviities, are not subject to inspection by any state agency except as provided for all vehicles by Section 680 of the Vehicle Code which authorizes the California Highway Patrol to "spot" check any vehicle on the highway to determine its fitness for safe driving.

2. That the transportation facilities in use by private schools are divided into several categories:

a. By school-owned and operated buses.
b. By contract with private bus owners.
c. By common carriers on regular routes.
d. By common carriers on irregular routes (temporarily assigned to carry school children).
e. By municipally owned and operated transit systems or transit authorities created by specific act of the Legislature.
f. By motor vehicles of any type carrying not more than eight persons, including the driver.

3. That many school-owned and operated school buses were regularly inspected under the direction of their own personnel.

4. That several private school authorities, particularly those who own and operate their own buses, have had those vehicles regularly inspected by Highway Patrol inspectors.

5. That many private school authorities who used them believed that the contract buses in use were subject to inspection by Public Utilities inspectors.

6. That private school operators were unanimous in the desire to have buses used in the transportation of their children regularly inspected by some state agency.

7. That vehicles presently used to transport private school pupils are not of any standardized design, color or construction, nor are they all equipped in the same manner.

8. That, because of excessive expenses involved, private school buses should be exempt from certain statutes, rules, and regulations relating to construction design, operation and equipment applicable to public school buses, where the safety results intended to be attained by those rules and regulations are being accomplished by other methods.

9. That a nonpublic school bus, engaged in the transportation of children from a school in Los Angeles, recently suffered an accident which resulted in the death of five pupils and the driver and the injury of 22 other children.

10. That postaccident investigation into the causes of that school bus disaster disclosed that a series of mechanical failures had resulted in the air hoses leading to the rear-wheel brakes being broken. The bus was thus deprived of any brakes because the drive shaft had broken loose preventing use of emergency brakes; also, the front-wheel brakes had previously been disconnected and were inoperative.

11. That the mechanical failures noted in paragraph 2, above, would conceivably have been discovered and remedied had the bus been properly inspected prior to the accident and the tragedy thus been prevented.

12. That drivers of private school buses are not required to hold a certificate of qualification issued by the Department of Motor Vehicles as are drivers of public school buses.

13. That in some instances the Public Utilities Commission loses control of common carriers when they are diverted for limited periods of time from their regular runs and are used to transport pupils to and from public or private schools, thus creating a "weak link" in the chain of inspection authority.

14. That the Public Utilities Inspection Force is not adequate to assume the responsibility of inspecting additional vehicles such as those now in use by private school activities.

15. That the California Highway Patrol has, whenever requested, and on a voluntary basis, inspected private school buses.

16. That the California Highway Patrol, which now has the responsibility for the inspection of all public school buses, is equipped for and has adequate personnel to include all private school buses in their inspection routine, and will assume this additional duty if so directed.

C. RECOMMENDATIONS

It is recommended that remedial legislation be passed which will amend the Vehicle Code in the following particulars:

1. To revise the definition of a school bus to include buses which carry children to and from private schools and to and from private school activities. As presently written the code is only concerned with public school buses.

2. To add a section to the code for the purpose of defining a private school.

3. To add a section to the code specifically requiring the California Highway Patrol to conduct inspections of all school buses, public and private.

4. To require that no school bus shall be operated which does not display a certificate issued by the California Highway Patrol bearing an inspection date within one year of the date of operation.

5. That private school buses shall be required to meet safety provisions similar to those set forth in the California State Department of Education, "Regulations and Laws Relating to Pupil Transportation in California," with only such exceptions as the Commissioner of the California Highway Patrol deems necessary to permit such school buses to continue in operation. No such exception shall be made which would, in the opinion of the commissioner, jeopardize the safety of pupils transported.

6. To incorporate in the Vehicle Code the specific requirement that drivers of all school buses, public and private, obtain a driver's certificate similar to that described in the California State Department of Education, "Regulations and Laws Relating to Pupil Transportation in California," and now required for drivers of public school buses.

7. That certain P. U. C. controlled buses, when diverted from regular runs for use in the temporary transport of pupils to and from public or private school activities, be required to remain under inspection control by the P. U. C. during the temporary period of such diversion.

D. BACKGROUND OF SCHOOL BUS SAFETY PROBLEMS

The term "private school," where used in this section, will refer to any nonpublic school, whether conducted for profit or not, giving courses of training similar to those used in any grade of the public schools from kindergarten through the twelfth grade, including but not limited to schools owned or operated by any church.

Historically, highway vehicles which have been designed for and used specifically for the transportation of passengers for hire, are subject to regulation and control by the California Public Utilities Commission. That body prescribes, among other things, safety regulations which pertain to load capacity, operation, maintenance, and equipment. The commission also regulates the manner and interval of inspections of passenger-carrying vehicles by its Inspection Department. This regulatory power by the Public Utilities Commission is the natural outgrowth of experience along similar lines, which has long been applied to the railroads, interstate bus lines, and other public passenger carriers.

Following the example and experience of the Public Utilities Commission, and being aware of the need for inspection of vehicles to assure their safe operation, the buses used for the transportation of children to and from our public schools and public school activities have been inspected by the California Highway Patrol since 1932.

At hearings held by this committee, effort was made to find out why buses used in the transportation of private school children were not required to be inspected at regular intervals in a manner similar to inspections of public school vehicles.

While no direct overall answer to this question was received it was implicit, from the accumulative testimony obtained at the several hearings which were held, that there was a basic reason. That reason was

that the need for bus transportation was not like that of the public school—something that was inherent in the establishment itself. When a public school was planned, everyone knew what area it would serve and bus service was included where necessary. With private schools, however, the need for bus transportation was a gradual growth because of factors which will be noted in the following paragraphs.

The requirements for transportation varied with each type of school. The sort of inspection afforded varied with the experience of each school administrator. There was no homogeneous set of rules or precedents for them to follow.

Several witnesses testified, for example, that they were under the impression that all passenger-carrying buses which they contracted for school use were subject to inspection by the Public Utilities Commission. A case in point is that of Father James J. Nevin, Pastor of All Saints Roman Catholic Church, Los Angeles. It was the tragic wreck of the All Saints School bus in which five children and the driver were killed and 22 others were injured that brought about this investigation. Father Nevin stated that he believed that that bus had been inspected by the Public Utilities Commission until the inquiry after the accident reported otherwise.

Several other witnesses, particularly those who represented school groups that owned and operated their own vehicles, reported that they had asked the California Highway Patrol for inspection service and it was granted. Consequently their equipment is inspected regularly in the same manner as are public school buses.

Others stated that they thought Article 680 of the California Vehicle Code was sufficient authority for regular inspection of all vehicles. Article 680, in fact, only authorizes any police officer, including the California Highway Patrol, to "spot" inspect any vehicle on the streets and highways if he has reason to believe that such vehicle is not equipped as required by the Vehicle Code or is in such an unsafe condition as to endanger the driver or other occupants, or any person on the highway. It in no way requires a regular, in-the-garage safety inspection.

But the principal reasons private school buses have not been placed under any regular inspection system is that the need for the service was a slow development generally and there was no central service of administration to require such service.

The need for bus transportation for many private schools was not apparent until the World War II era. But these schools felt the effect of the same movement trends which have convulsed the people of California in recent years. That is, during the World War II years there was a concentration of population within already established urban areas as industries were forced to expand—usually at or near the original sites of their operation. The private school was usually located contiguously to those areas and drew its pupils from them. Then, as the "cold war" created a need for further expansion of old plants or for the establishment of new industries to meet the demands of atomic and electronic development, large housing communities sprang up in or near our centers of population, giving birth to the phenomenon known as the "metropolitan area." Many of their patrons moved to these outlying areas, but continued as pupils of the school. Many

parents who formerly drove their children to and from school, either as an individual effort or as a transportation pool project, were no longer able to do so, usually because of the greater distances involved or because the mothers—who had performed this service—were now employed.

Therefore, due largely to dispersal of patrons, lack of driving pools because the mother-driver was now employed and no longer able to provide this service, it has become more and more the trend for private schools to provide the means by which their pupils are carried to and from the school.

E. ACTION TAKEN BY THE LEGISLATURE

Several bills were introduced in the First Extraordinary Session of the California Legislature in 1958, to require that all private school buses be inspected by the California Highway Patrol in a manner similar to the inspection now required for public school buses. The bills so introduced were:

Assembly Bill No. 17—Gaffney et al.;
Assembly Bill No. 2—Anderson et al.;
Assembly Bill No. 10—Marsh et al.

Because of the similarity in the intent and wording of these bills the Transportation and Commerce Committee suggested, and the principal sponsors of the several bills agreed, that: to avoid confusion and to insure all possible speed in passage be effected, that the bills be consolidated under the title, "Anderson-Gaffney-Marsh Act of 1958."

The bill, Assembly Bill No. 2, as passed by the Legislature and approved by the Governor, contains the best features of all the legislation offered. It is designed to assure that all public vehicles used to transport children to and from public and private schools and public and private school activities be inspected at regular intervals by the California Highway Patrol to assure their safe condition mechanically. In addition, all drivers of those vehicles will be required to pass a rigid examination to determine, as far as is possible, their fitness to assume the responsibility entrusted to them.

Chapter VI

PROBLEMS OF HIGHWAY SAFETY: SAFETY DEVICES AND REGULATIONS

A. SUPPLEMENTARY BRAKES OR BRAKE WARNING DEVICES

1. Background of the Report

The number of major accidents occurring on California highways for which heavy trucks, or truck-trailer combinations are responsible is not great when compared with the number of such vehicles registered in California. Likewise, the percentage of such accidents attributable to mechanical failure is small when compared to the overall accident rate.

Only 3.5 percent of all motor vehicle accidents in this State result from mechanical failure; about one-half of this number are caused by faulty brakes. We know that human failure, of some sort, is the cause of the other 96.5 percent of motor vehicle accidents.

A great many studies have been made of the human factor in traffic accidents. The accident-prone driver has been under observation for several years. Owners of fleets of trucks, in particular, have weeded out those driver-employees who have been found to be physically and/or mentally unfit to operate a motor truck. The California Teamster's Union also has been active in driver selection and training, particularly with regard to drivers of heavy commercial vehicles of all sorts. The California Vehicle Code provides the machinery for depriving traffic law violators of their driver's licenses in aggravated cases, thus keeping some potential accident producers off the highways.

The automotive industry has improved the arrangement of truck cabs to make them more easily and comfortably operated to reduce the driver strain and fatigue which has been a contributory factor in many truck accidents. However, much more needs to be done in the field of driver comfort, particularly as it relates to the accessibility of the operating mechanism controls, reduction of vibration, excessive noises, and the elimination of carbon monoxide fumes from the driving area of the vehicle.

But this report is particularly concerned with safety features such as warning signals indicating loss of brake efficiency, and/or supplementary braking devices for emergency use when the regular equipment brakes have become inoperative. While faulty brakes have been the cause of a relatively small percentage of highway accidents, the loss of life and property damage caused by heavy trucks careening out of control down our highways and on our city streets has justified the studies made by the committee.

2. Findings

a. That of all highway accidents reported to the California Highway Patrol, only 3.5 percent are attributable to mechanical failure of the vehicle involved.

b. That 48 percent of all mechanical failure accidents are caused by faulty brakes.

c. That the brake failures which have occurred where heavy vehicles have been involved have frequently resulted in spectacular runaways on downgrades on California highways and on city streets.

d. That faulty brakes, too, have been the cause of many less dramatic truck or bus accidents on level roads and streets.

e. That many brake failure accidents might have been prevented if the driver had been provided with adequate warning devices or if the truck were equipped with supplementary emergency brakes.

f. That many commercial safety devices are now available for installation on heavy trucks, and truck-trailer combinations, which are designed to warn the driver of brake failure and/or supply supplementary braking facilities.

g. That General Order 99 of the California Public Utilities Commission does now require all motor vehicles under its jurisdiction for inspection to be equipped with several types of signal devices to indicate the condition of the airbrake equipment installed on those vehicles. This requirement has been found to have been effective in reducing the incidence of accidents due to brake failure.

h. That this committee does commend the Trucking Industry and the California Teamster's Union for their part in the selection and training of operators of heavy motor vehicles in an effort to reduce the driving hazards on California's streets and highways.

3. Recommendations

The Interim Committee on Transportation and Commerce does not, at this time, recommend any legislation requiring the adoption by the trucking industry of supplementary brakes. It does, however, believe that the industry should continue to review their safety programs including their care in the selection and training of their drivers.

The committee does recommend that all trucks, and truck and trailer combinations, be required to be equipped with airbrake signaling devices of types now required by the California Public Utilities Commission and the Interstate Commerce Commission for installation on the motor vehicles under their supervision.

The following amendments to the California Vehicle Code are recommended to insure that adequate information concerning the condition of its airbrakes is available to the driver:

a. Air Governor Adjustment

That the governor on the air compressor of an airbrake system shall have a minimum cut-in pressure of 80 pounds per square inch.

b. Air Pressure Gauge

That every truck and truck-tractor registered in this State and equipped with an airbrake system, be required to have an air pressure gauge accurate to within 10 pounds. The pressure gauge shall be of re-

liable and satisfactory construction, maintained in an efficient working condition, and visible and legible to the driver at all times.

c. Low Air Pressure Warning Signal

That an adequate low air pressure warning signal, either audible or visible, and in good working condition be required on every motor vehicle employing the use of airbrakes. Consideration should be given to test methods for accuracy of low air pressure warning signals, air governor and air pressure gauge.

d. Vacuum Gauges

Every motor vehicle or the towing vehicle of a combination of vehicles which employ service brakes actuated by vacuum power shall be equipped with a reliable vacuum gauge maintained in efficient working condition and so installed as to be visible and legible to the driver at all times.

e. Special Examinations for Driver's Licenses

While this committee did not specifically study the subject of physical and mental fitness as a part of the requirements for obtaining driver's and/or chauffeur's licenses, enough testimony was offered at the several hearings to warrant the recommendation that the Department of Motor Vehicles, Division of Driver's Licensing, be given the legal tools with which to deal with this problem, if the tools they now have are not now considered adequate.

B. REGULATIONS GOVERNING TRANSPORT OF FARM-LABOR WORKERS ON CALIFORNIA HIGHWAYS

1. Background of the Report

There have been many instances, in the interim 1957-59, of highway accidents which have resulted in the injury and death of farm labor, and the serious loss of property. While many of these accidents have occurred on our streets and highways, many cannot actually be classified as traffic accidents. Instead they were due to the thoughtless or careless disregard of the safety of the farm laborers who were being transported by their employers to or from the place of their employment.

In one instance a truck transporting more than 40 braceros (Mexican farm laborers) contained several cans of gasoline in the passenger compartment as well. When fumes from the gasoline were ignited 13 of the men perished in the resultant flames and 19 more were hospitalized with serious burns.

On another occasion, 43 farm laborers were being transported to work in a vehicle with an approved capacity allowance of 18. The driver had no driver's license; the vehicle, likewise, was unlicensed. When this overloaded truck capsized while negotiating a turn, 35 of the occupants needed hospitalization. Fortunately, none were killed.

The two examples cited here represent the unusual and dramatic results of thoughtlessness or carelessness in the transport of California's farm laborers, many of whom are seasonal imports from Mexico.

At this time, too, it must be stated that individual farm owners do not always transport the laborers who work for them. It was brought

out in a San Francisco hearing that farm labor is often transported to and from the places of their employment by farm labor contractors or farm labor associations. However, some large farm operations do transport their seasonal labor force in their own equipment, and many small farmers pick up their help in their own automobiles or trucks.

Equipment used to carry farm labor is subject to the same safety regulations as are all other highway vehicles. This refers to Sections 139.37 and 670 of the California Vehicle Code. Section 139.37 empowers the California Highway Patrol to enforce safety regulations of other California departments pertaining to motor vehicles on the highway; Section 670 to inspect all vehicles to insure that their brakes and other equipment are in safe condition while they are being operated on a California highway.

However, since the trucks and other equipment used in the transport of laborers to and from the farms where they are employed, usually are on the highways for very short distances, inspections to assure the safety of those persons being transported, might more effectively be performed by personnel of the Industrial Safety Division of the California Industrial Relations Department at the labor camps which are the usual points of departure.

Findings

a. That the development, promulgation, and enforcement of safety regulations governing the transportation of farm labor in California is the responsibility of the Industrial Safety Division of the California Industrial Relations Department.

b. That because of the number of fatal accidents involving farm labor which have occurred recently (apparently due to the inadequacy, lack of proper dissemination, or enforcement), the Industrial Safety Divison is re-examining and rewriting their safety regulations as they pertain to the transportation of farm laborers.

c. That, because many braceros (Mexican laborers) are here on a seasonal loan basis, certain international agreements affect their safety while in transit. The vehicle which transports them as well as the driver, must conform to California school bus regulations. However, this safety regulation only protects these workmen while they are being transported from the Mexican border to the area of their initial employment.

d. That there is no requirement in the California Vehicle Code that drivers of farm laborers shall have a chauffeur's license, nor are there special safety regulations pertaining to the vehicles which transport them after they have been delivered from the Mexican border to their areas of employment.

e. That several serious accidents have occurred involving farm labor in transit to and from the farms where they are to work. While these accidents have not always been due to mechanical or driver failure, careless or thoughtless disregard of the safety of the laborers has caused fatalities to occur.

f. That lack of communication facilities between the driver's cab and the passenger compartment was a contributing factor in a fire which resulted in the death from burns of 13 laborers because the driver

was not aware of the holocaust until too late to stop the truck and assist in the debarkation of the men.

g. That considerable communication difficulty exists at all times because of the number of braceros who cannot speak English and drivers who are unable to understand Mexican-Spanish.

h. That because the vehicles carrying farm labor are only on the highways for brief periods of time, the California Division of Industrial Safety representatives are best able to check farm labor trucks at the points of departure from labor camps.

i. That, in addition to the authority of the California Highway Patrol and the California Division of Industrial Safety, the United States Department of Labor representatives are authorized to inspect farm labor trucks on the highway, if they are carrying Mexican nationals, to assure their safety.

j. That the Division of Industrial Safety, California Department of Industrial Relations has been in the process of completely reviewing and revising their safety regulations as they pertain to the transport of farm labor.

k. That safety regulations are of no consequence unless they are promulgated to all those who are concerned with transporting farm labor and are enforced by the proper enforcement agency.

3. *Recommendations*

From the testimony obtained at hearings, and from facts arrived at through research, it would appear that there has been a lag in the process of the development, promulgation, and enforcement of the safety regulations pertaining to the transportation of farm labor. The tragic accident in Monterey County which resulted in the death from burns of 13 Mexican farm laborers has alerted the Division of Industrial Safety to the need for revision of these regulations. A thorough study is now being made by that office to determine what changes should be made in the regulations and in the methods of enforcement.

In order to implement the work being undertaken by the Department of Industrial Relations to assure the safety of farm laborers while being transported to and from the places of their employment, this committee recommends:

a. That when the revised safety regulations are printed, they be given thorough distribution so that all agencies and persons concerned with the safe transportation of farm labor, as well as those engaged in their transport, be aware of their contents.

b. That copies of those regulations be printed in the Mexican-Spanish language and distributed to all labor camps where braceros are housed so that those Mexican nationals may know what steps are being taken to assure their safety.

c. That copies of the regulations, in both English and Mexican-Spanish, be conspicuously posted.

d. That the State Department of Industrial Relations be memorialized by House resolution to speed up the review and promulgation of their safety regulations as they apply to the transportation

of farm labor. The resolution should also request that representatives of the Department of Industrial Relations inspect farm-labor buses at the points of departure from and return to labor centers.

e. That the California Vehicle Code be amended so that all drivers of vehicles engaged in the transport of farm labor be required to have a chauffeur's license.

Chapter VII

PROBLEMS OF LOG HAULING

A full report on the problems of log hauling was made to the Assembly by the Interim Committee on Transportation and Commerce on February 24, 1953. This report, therefore, is concerned with problems in the industry which have arisen since that time or which were not resolved as a result of the 1953 report.

A. WEIGHT TOLERANCE FOR LOGGING TRUCKS

1. Background

The 1957 Session of the California Legislature added Section 705.3 to the Vehicle Code. This permits a tolerance of 2,500 pounds in weight-limit allowance on the group of axles permitted by Section 705(a). This allowance, or weight tolerance, to apply only on those trucks and vehicle combinations actually transporting loads composed solely of logs. This statute, Chapter 949, Statutes 1959, to be operative only to the ninety-first day after the adjournment of the 1959 Session of the Legislature.

This tolerance was deemed essential to the log-hauling industry, primarily because of the problems encountered in estimating the weight of logs at the point of loading in the woods. To get some idea of the extent of that problem the following is quoted from Page 9 of the Assembly Interim Committee on Transportation and Commerce Report, *Problems of Log Hauling,* referred to above:

> *"A. The Single or Butt Log*
>
> Butt logs are the most valuable part of the tree; the finest lumber comes from them, and they are the heaviest part of the tree. Because of their density, however, hauling a single log frequently constitutes an overload under present law. In instances where the total weight is within legal load limits, there yet remains the problem of axle overload because of the impossibility of distributing weight evenly where the length or tapered shape of the log interferes. Therefore, in one-fourth to one-third of instances the operators are forced to leave these logs in the woods, a waste of natural resources which took decades or even centuries to produce.
>
> "Splitting these logs in the woods results in considerable loss, estimates varying from 25 percent to 40 percent depending upon the specie.
>
> *"B. Unknown Weight Element*
>
> The lumber industry uses, from log harvest to final mill product, a scale based on board footage. State law, however, bases load computation strictly on weight in pounds. Thus the difficulty involved in accurately loading trucks in the woods is considerable. An experienced operator can visually determine board feet measure accurately, but no matter how experienced he may be in

measuring timber, he cannot consistently guess within 5 percent the weight of logs. A research project studies hundreds of logs, loaded by experienced men. The weight of these loads varied more than 10 percent. Accordingly, the logloader would have to load his trucks well under the gross allowable load to be certain of remaining within the law.

"1. Density variation. Variation in weight compared with equal board foot measure cannot be computed accurately in the woods. In the case of sugar pine there is variation in lumber weight from 7 to 15 pounds, some running even higher. Two logs may be of equal size yet one will weigh two or three times as much as the other. Weights can be determined fairly accurately in the field by use of scales, but weighing every log is economically not feasible. As Fred J. Grumm, Consulting Highway Engineer, explained, 'Suppose you allow one minute for that sort of operation (per log). It only takes 60 minutes to make an hour, and * * * the cost of loading and the operations that are involved in loading and hauling run as high as $1,000 per hour out in the woods.' "

As a result of this legislation, which granted log haulers a weight allowance of 2,500 pounds on any group of axles plus the 3 percent tolerance already provided by the California Highway Patrol when they weigh a vehicle to determine whether or not it is loaded to conform with weight limits and other safety factors, this problem of the log haulers has been greatly reduced.

It should be pointed out here that the 2,500-pound weight allowance was not intended to increase the permitted load limit of the vehicle, but only to provide an additional factor of safety to the log hauler in estimating the legal weight distribution.

That this weight tolerance, which was granted on a trial basis, is working satisfactorily to all concerned: with log haulers, the California Highway Patrol, and local justice court judges, is well summarized in testimony offered by Mr. William R. Lee, Secretary Manager, North Coast Lumber Truckers Association of Humboldt-Del Norte Counties. He stated in part as follows:

"One of the most obvious results noticed by one in almost constant contact with the log truckers and members of the California Highway Patrol is the improved relationship between truckers and the patrol. When a trucker receives an overload citation now, in most cases he feels he is deserving of the citation, and accepts it without argument or rancor. It is also my opinion that the patrolmen who are acquainted with the log-hauling problems feel completely justified in issuing the citation rather than doing it merely because it was their instructions.

"Another noticeable change since the granting of the axle weight variance is the decrease of sympathetic attitudes previously displayed by the courts and the general public toward small overload citations.

"I am offering as exhibit copies of the uniform bail schedule of the justice court judges of Humboldt County, the one before the tolerance came into effect and the other which is in effect at the present time.

"You will notice that the bail on a 3,500-pound overload previously was $11—now it is $16; a 5,001-pound overload previously was $27—now is $63; a 8,001-pound overload was $42—now $258; a 10,000-pound overload was $58—now is $336. In fact the bail schedule for logging trucks is considerably higher than for corresponding overloads for lumber or any other type of truck. The judges have also inaugurated a policy of increasing the bail required with each additional appearance of the truckers.

"One reason the judges have changed their attitude toward these citations is that they feel that under the existing variance justice is being served where previously it was not."

2. *Recommendations*

The additional 2,500-pound weight allowance authorized in Section 705.3 of the California Vehicle Code has been of great benefit to the logging industry. In addition it has rendered a good service in that it has made for a good working relationship between the industry and the California Highway Patrol. There has been no adverse criticism of it from any source.

It is recommended, therefore, that this weight allowance, due to expire ninety-one (91) days after the end of the 1959 Session, be made permanent.

B. FLAT SPOT BILL, ASSEMBLY BILL NO. 118

1. *Background*

This bill would add Section 705.2 to the California Vehicle Code relating to weight limits for logging trucks.

As presently governed by Section 705 (b) of the code, gross weight limits are authorized for all vehicles, or combination of vehicles where the distance between the first and last axle is 18 or more feet, on the basis of the ratio of weight allowed to the distance between the axles. As an example, at eighteen (18) feet the gross weight allowed is 46,000 pounds while at fifty-six (56) or more feet the gross weight allowance is 76,800 pounds.

However, there is a so-called "Grandfathers Clause" in the length-weight ratio which fixes the gross weight allowance at 68,000 pounds in the forty-one (41) through forty-six (46) foot lengths of vehicles.

What Assembly Bill No. 118, 1957 Session, proposed to do was to abolish the "flat spot" or fixed gross weight of 68,000 pounds in the forty-one (41) through forty-six (46) foot lengths of logging trucks and substitute a sliding scale increase of 550 pounds for every foot of length; thus, at forty-one (41) feet the gross allowed weight would be 68,550 pounds while the forty-six (46) foot allowance would be 71,300 pounds. The total allowed gross weight for any vehicle, regardless of length, would be 76,800 pounds, the same as presently allowed.

This measure passed the Legislature but was "pocket-vetoed" by the Governor.

The only opposition to this "flat spot" elimination came from a representative of the Division of Highways, Department of Public Works, who stated in part as follows:

> "We feel that the passage of Assembly Bill No. 118 would have a harmful effect on the State Highway System in the lumbering areas. We have consistently, over a long period of time, felt that increasing weight limits of freight vehicles would have this effect because the great majority of state highways are at this time carrying the maximum load that can be carried with safety to the highway and to the traveling public. Larger and heavier vehicles increase the load on the highways, increase the cost of maintenance, bring about the necessity of earlier reconstruction, and increase traffic hazards."

In order to more economically conduct their business, a large percentage of log haulers in the redwood logging areas of the State have now lengthened their vehicles to the full 56-foot limit in order to take advantage of the maximum weight allowances authorized by the Vehicle Code. According to Inspector O'Connell of the California Highway Patrol, records indicate that 80 percent of log-hauling vehicles in the redwood country have been extended to 56 feet.

A summary of their views is that elimination of the "flat spot" would make for safer loading methods and would result in a 90 percent safer logging operation and a 10 percent gain in the industry's economy in handling logs of the length which would usually be hauled in rigs with the 41- to 46-foot axle distances without increasing the presently allowed maximum gross weight of their vehicles.

2. *Recommendations*

This committee, after giving full consideration to the opposition expressed by the Division of Highways, Department of Public Works: that California highways are presently carrying all the load they can bear, feels that the proposed elimination of the "flat spot" in weight allowances in the 41- to 46-foot distance between axle areas for log-hauling vehicles would not increase the overall weight load on the highways where the operation is carried on.

It is recommended that Assembly Bill No. 118, or some similar legislation, be introduced in the 1959 Session of the Legislature to eliminate the "flat spot" as it now exists in the California Vehicle Code and substitute a progressive increase in the length-weight ratio of gross weight allowances for all log-hauling vehicles in the 41-46-foot axle lengths.

C. PIGGYBACK BILL, ASSEMBLY BILL NO. 129

1. *Background*

This bill would require that all empty "flat bed" trailers be carried "piggyback" by the hauling vehicle.

It was declared that there had been serious accidents caused by empty trailers whipping out of a safe path while being hauled. This danger was alleged to be particularly critical on curves.

Representatives of the trucking industry and the California Highway Patrol stated that the California Vehicle Code contains regulations adequate to keep unsafely coupled flat bed trailer combinations from operating on the highway. They stated that accidents of the sort

described were due to careless drivers who were attempting to negotiate curves at unsafe speeds.

Another objection to the bill was that it did not set a limit on the distance that the vehicle combination would be permitted to travel empty before it would be required to be hoisted "piggyback." It was stated that literally thousands of flat bed trailer combinations are in use by farm operators. These travel such short distances that it would be uneconomical and a loss of time if they were required to be carried piggyback.

No proponents of the bill testified at the hearing.

2. *Recommendations*

None at this time.

Chapter VIII

METROPOLITAN AREA SMOG AND FREEWAY NOISE PROBLEMS SUMMARY

SCOPE OF REPORT

It is the purpose of this report to review past studies of the smog and noise nuisances produced by motor vehicles in the heavily trafficked metropolitan areas and to obtain information concerning the current status of research programs by industry and governmental agencies designed toward the development of principles and devices with which to combat the spread of noxious gases and annoying noise.

A. SMOG CONTROL DEVICES

1. Background

This committee delayed its hearing on the problem of control of that portion of smog which is induced by motor vehicle exhaust fumes until after the automotive industry had completed its symposium on this topic in the late fall of 1958. This was done in order that testimony might be taken and information obtained from which some conclusions could be reached on the progress of research in this field. From this testimony it was hoped that recommendations could be made concerning the type, or types, of devices which could be used as standards for installation on motor vehicles in California to reduce the output of smog-producing hydrocarbons and oxides of nitrogen from automotive exhausts. The conclusion by the Los Angeles Air Pollution Control authorities, based on nearly 10 years of research on the part played by the automobile in the increasing smog problem is the basis for the assumption that they are a major contributing factor.

That group has stated that photochemically induced reaction between oxides of nitrogen and hydrocarbons is responsible for a major portion of Los Angeles area smog. They believe that between 60 and 66 percent of the eye-irritating air pollutants are produced by unburned automobile exhaust extrusions and by evaporation of gasoline from carburetors and from gasoline tanks. In this connection, it should be explained that there is a general principle that the higher the temperature of the combustion chamber the lesser the amount of unburned particles that are ejected from the exhaust system; whereas the warmer the atmosphere in the regions of the carburetor and the gasoline tank, the greater the mount of smog-producing materials that are evaporated from the gasoline into the surrounding area. This accounts for the varying percentages of smog produced by automobiles in the Los Angeles Basin. On cool days the lesser amount of 60 percent is produced while the hottest days of 100 degrees F. bring about the higher figure of 66 percent. These are conclusions reached by the research department of the Los Angeles Air Pollution Control District.

As a result of these assumptions concerning the part the automobile has played, and is playing, in the overall production of smog, not only in the Los Angeles area but elsewhere, the automotive industry in 1953 organized a Vehicle Combustion Products Committee under the direction of the Automobile Manufacturer's Association Engineering Advisory Committee, for the purpose of establishing an intensive, co-operative research program to develop methods for the control of the emissions of automotive exhaust gases which contribute to the air pollution problem. This action was undertaken primarily to assist the Los Angeles community to combat the automobile-induced factor of photochemical smog. The industry program has been conducted since that time at a cost of approximately one million dollars a year, as reported by them to an Assembly committee on October 22, 1958.

2. *Problems Encountered*

The problems encountered and which have not yet been completely and satisfactorily resolved by research teams representing both the Los Angeles Air Pollution Control District and the AMA are numerous. As pioneers in the search for instruments with which to accurately measure the effectiveness of principles which have been advanced to control the output of smog-producing gases from automobiles, the Los Angeles APCD believes that they have succeeded in effecting a breakthrough in this particular. As an example, this improved instrumentation has made it possible for their researchers to eliminate the deceleration cycle of automotive operation as the principal cause of smog production by the automobile. While this discovery was of major importance, it has had the effect of increasing rather than decreasing the overall problem of control. This seeming paradox is, really, rather simply explained. While the problem of engineering a suitable device to control the gasoline intake to the motor so as to eliminate, or greatly reduce the quantity of a "rich" mixture of fuel passing through an idling motor was found to be a simple one, still the problem of installing such a device on the three million cars in Los Angeles County was a major one and would have required from two to three years to effect. Since it was discovered that the deceleration cycle was responsible for less than one-fourth instead of more than one-half of the automotive smog production, this would have been a major blunder.

But the elimination of the deceleration cycle as the major factor in automotive smog production has not reduced the scope of the problem. Instead, the improved instrumentation made it manifest that it would be necessary to control the gaseous output induced by all phases of car operation: that is, idling, cruising and acceleration as well as deceleration. This meant that any control to be effective, would have to be located in the exhaust system. That is where research, currently, is being concentrated.

3. *Principles and Devices*

Two major principles for the reduction, percentagewise, of motor vehicle exhaust fumes have been developed. These are the use of catalytic converters to oxidize the exhaust hydrocarbons and the installation of afterburners to complete the combustion of the fuel which has passed, unburned, from the engine into the exhaust system.

Both these principles represent breakthroughs in the overall problem of reducing the amount of hydrocarbons produced as the result of the emission of unburned fuel from the motor to the surrounding atmosphere. But these developments do not solve the major problem, that of developing a device (or devices), designed in such a manner so as to be effective, economical, and of a size and shape to be symmetrically and readily installed on all types of automobiles. Doctor Leslie A. Chambers, Director of Research for the Los Angeles APCD, outlined to this committee during a hearing in Los Angeles, California, on December 1, 1958, the magnitude of the problem in the following quote:

> "Mr. Griswold has summarized the engineering-technical position in a general way, very well indeed. Before throwing myself open to answer some of the questions which Mr. Griswold declined to answer, I would like to make one or two points.
>
> "First of all, there is a continual question as to why progress on the development of control on the automobile exhaust has been, apparently, so slow. I would like to call your attention to the fact that the speed with which control development has been accomplished up to the point Mr. Griswold has described, has been exactly proportional to the emphasis that has been put on efforts to understand what the nature of the control problem is.
>
> "What Mr. Griswold meant by saying we had some important breakthroughs on control, was literally that we have had some important breakthroughs on what the understanding of the nature of the problem is and from that we are automatically falling into possibilities of control.
>
> "Now, to clarify one or two points all at once, I would like to emphasize that what Mr. Griswold spoke of as a device which is under test, under exploration, in each case, is literally not the device in the usual sense in which that term is used in the newspapers. It would be better, I think, to speak of these so-called devices as principles which are under investigation, principles which are promising, but in no case is a device that you can put your hand on and install on an automobile at will. They have possibilities.
>
> "In the second place, I think it would clarify things a bit to point out that each of these principles under investigation is, in fact, not likely to become a single piece of hardware which can be put on an automobile, but will be something in the nature of a control system. Now, this is true because of the complexity of the operation of an automobile engine. It requires different amounts of air, different cycles in its operation, decleration, acceleration, idling, cruising, it requires—it puts out different volumes of exhaust during each of those cycles and in those volumes are different amounts, different concentration levels of hydrocarbons which must be burned. This means that you have to add secondary air in certain stages to promote combustion and in other stages you don't have to add such air. In fact, it cools the thing down. You have got to maintain temperatures in the afterburners. This requires heating in certain stages and not at others and the net result is that what we are dealing with, in all of the systems that are under

study now, are literally systems and not pieces of hardware in the sense of putting a muffler on the underside of an automobile.

"Now, obviously, when you start adding mechanical and electrical linkages to govern the complex operation of such a system in relation to its performance of the engine, while the driver is moving it, you are adding to the cost. I think it can be said right now that principles exist on the basis of which systems could be built and installed in cars which would completely eliminate the exhaust problems so far as hydrocarbons are concerned, if we had no economic factor to consider. The problem is not is as simple as the development of an atomic bomb because there was no cost consideration. In this case, we have necessarily got a cost consideration and the problem is to find a principle or system which can be engineered into a level of efficiency that will be effective and at the same time will not put an undue burden on the operators of vehicles."

4. Finding of Facts

a. That research by an agency of the Los Angeles Air Pollution Control District, over a period of about eight years, has convinced that body that between 60 and 66 percent of the eye-irritating, crop damaging, smog is caused by photochemically induced reactions between the hydrocarbons and oxides of nitrogen which are contained in automobile exhaust gases.

b. That the Automobile Manufacturers in 1953 began a co-operative attack, with the Los Angeles APCD on the problem of reducing the emissions of hydrocarbons and oxides of nitrogen from automobiles.

c. That in recent years it has been determined that control of the problem can only be effected by the installation of a suitable device in the exhaust system of automobiles, rather than by controlling the fuel mixture and quantity during the deceleration and idling cycles of motor operation.

d. That the AMA, in conjunction with the Los Angeles APCD, have developed two main principles of control of automobile-induced smog. These are:

1. The principle of using a catalytic converter to oxidize or dissolve the unburned hydrocarbons. These are of several types, using different catalytic agents, such as:
   a. The Oxy-Catalyst (Houdry-GM) Converter
   b. The Vanadium Pentoxide (Ford) Converter
   c. The Vanadia-Alumina (Ford) Converter
2. The afterburner principle designed to complete the combustion of unburned gases in a furnace-type device in the exhaust system.

e. That, at the time of going to print, no device, based upon either of the above principles, has been developed which could be installed on automobiles already in operation.

f. That some of the problems confronting the AMA in the design and production of a suitable operating device, employing either the catalytic converter or afterburner principle of hydrocarbon control, are:

1. Design, including size, shape, weight, safety, and installation characteristics.
2. Quantity of production. Will there be a market for such a product in areas other than Los Angeles or, in the maximum, all of California?
3. Buyer opposition to cars equipped with smog control devices, regardless of local or state regulations. This opposition is partly an economic one. The first cost of the least expensive device is now estimated to be between $125 and $200 per unit. In all of California this could mean an outlay of $1,125,000,000, at least, using an average cost of $150 per unit for 7,500,000 cars. This is a modest estimate. In addition, such a great outlay should be followed up by an adequate inspection system to insure that the devices are operating in an efficient manner. This could require a statewide inspection system for all motor vehicles with the concomitant problems of what type of inspection operation would be required, and whether state or private ownership (or a combination of both), would finance the project. Also involved would be the number and cost of individual inspections that would be necessary.

g. That there is some evidence to support the contention of the Los Angeles APCD that research in the field of smog control should be augmented and speeded up by assistance from state funds.

h. That even if a suitable device is developed to reduce the air contaminants produced by automobile exhaust fumes, there is still the problem of air pollution stemming from fumes caused by the evaporation of gasoline from automobile carburetors and tanks. The Los Angeles APCD estimates that as much as 84 tons of irritants are produced on the hottest days from this source.

i. That there is also the question of whether or not the automobile-induced air contamination is a local or a statewide problem.

j. That the witnesses representing the Los Angeles APCD were unanimous in their praise of the AMA smog control research team for their active interest in attempting to solve the Los Angeles smog problem and for the spirit of co-operation that exists between the APCD and the AMA research groups.

k. That a contributing factor in the problem of smog control is the rapid growth of the Los Angeles area which amounts to an equivalent of the entire present population of Pittsburgh, Pennsylvania, every three and one-half years. Industries and automobiles are increasing at least proportionately to the population growth.

l. That the California Highway Patrol will be ready to set up testing procedures whenever adequate smog control devices are produced and suitable standards for their operation are adopted. This could well require statewide inspection of all automotive vehicles at stated intervals because of the engineering difficulties which are apparent at this time.

m. Dr. Haagen-Smit, of the California Institute of Technology, in a letter to Chairman Lee Backstrand of the Southern California subcommittee, and which was read into the record, suggested an alternative to attempting the control of automotive-induced smog by the installation

of devices on all motor vehicles. This was that it might become necessary to legislate on the olefin content of gasoline to produce a fuel free from smog-producing ingredients.

5. Recommendations

The Los Angeles hearing by the Southern California Subcommittee of the Interim Committee on Transportation and Commerce was postponed until after the automobile industry's symposium on smog control devices was held in November, 1958. This was done so that some concrete recommendations might be obtained upon which legislation for the approval, control and inspection on a statewide basis, of the types of mechanical devices to be used could be passed. This type of legislation is considered to be necessary if and when the industry produces workable and efficient smog control devices.

The industry, it was learned, had not yet reached the point in its research and development program where it could offer any meaningful proposals for the committee to act upon insofar as a workable device was concerned. Witnesses did, however, present information which clearly outlined the immensity and complexity of the smog problem that now confronts the people living in the Los Angeles Basin and which threatens to engulf all the heavily populated Central Valley and coastal regions from Sacramento and San Francisco in the north to San Diego in the south unless some remedy is discovered and applied.

Assuming that automotive exhaust fumes represent the greatest presently uncontrolled source of the ingredients which are causing heavy eye irritation, vegetation blight, and which even threaten the health of the residents of affected areas, the following recommendations are submitted:

a. That the 1959 Legislature appoint a joint interim committee of the House and Senate whose purpose it would be to review the several smog research programs that are now being carried on throughout the State by private industry and public agencies to determine what steps can best be taken at state level to assist those bodies in their search for adequate and economical control devices for installation on automobiles to reduce automotive-induced smog ingredients.

That committee should have authority to investigate the research programs of industry in their efforts to reach conclusions as to the effectiveness of the work on those bodies.

While assuming that automotive exhaust fumes represent the greatest uncontrolled source of eye-irritating smog, the committee should be on the alert to follow up evidence pointing toward other causes.

The committee should be provided with sufficient funds to permit the retention by them of qualified experts to assist them in their investigation.

The committee should be prepared in their findings to make recommendations for implementing legislation to the 1960 Session of the Legislature.

b. This committee does not believe that research has developed a suitable device which is ready for installation on automobiles at this time. It does not, therefore, recommend legislation to require installa-

least in hospital zones. Typical of such complaints is one directed to this committee by the Administrator of the Hospital of The Good Samaritan. This hospital is one of the largest in the Los Angeles area and the nature of the complaint is cited in the following quoted communication:

"The Office of The Administrator
THE HOSPITAL OF THE GOOD SAMARITAN

LOS ANGELES, CALIFORNIA, November 19, 1958

Southern California Subcommittee of the Assembly
Interim Committee on Transportation and Commerce
Room 4132, State Capitol
Sacramento 14, California

GENTLEMEN: As Administrator of the Hospital of the Good Samaritan I have been concerned for years by the matter of shrieking sirens which disturb our patients. We have had numerous complaints from both patients and physicians.

It is my feeling that the use of sirens should be abandoned.

A flashing red light on an emergency vehicle brings almost instant reaction, whereas a siren shrieking from an unknown direction tends to confuse people if they hear it at all while riding in a car.

Certainly legislation is needed to better control the use of sirens in hospital zones if they cannot be banned altogether.

I appreciate the interest of this committee in the matter and hope that it will be possible through legislation to relieve our citizens, especially the sick ones, of this annoyance.

Sincerely yours,

(Miss) MARGARET J. WHERRY, Administrator

The question of whether the siren is as effective an attention-getting medium as the diaphonic horn or other devices was discussed. In London, England, it was alleged, sirens are not permitted on any emergency vehicle. Those vehicles are equipped with bells to warn of their approach. Bells, it will be remembered, were considered adequate for fire department vehicles in the United States until about World War I.

A representative of the Los Angeles Fire Department stated that the diaphonic horn was found to be very effective in clearing traffic. Excessive use of sirens by emergency vehicles had lessened their usefulness, he alleged.

Many factors tend to reduce the attention-getting qualities to motorists:

a. Driving with windows closed
b. Driving with radio operating
c. Driving with air conditioner or heater in use
d. Driving at high speeds, or a combination of all these factors
e. Traffic sounds, in general, tend to drowned out the siren or to confuse motorists as to its location or direction of travel.

Inspector Daniel J. O'Connell of the California Highway Patrol testified that the CHP is currently conducting tests to determine the efficiency of the siren versus the air horn. The tests, he reported, are not yet complete or conclusive but the effectiveness of the siren has not been found to be adequate on rural highways under closed car and high speed conditions. The following extract from his testimony is quoted:

"In our training program, at the academy, one of the very interesting things we do when we bring in our traffic officers for in-service training is to load them up in an automobile and start them down the road a ways about 60 to 75 miles an hour with the windows rolled up and have another car pursue them and for them to tell, according to the markers, when the siren is started, they being alert to the siren, knowing the siren is going to start and then, additionally, request they notify us when the gunfire, when the gunshots were fired at them and they are amazed. You don't hear the sirens when you are traveling at speeds in excess of 60 miles an hour."

There is some evidence that siren noise abatement is being brought about partly through self-discipline and partly as the result of more rigid law enforcement.

A private ambulance group in the Los Angeles area has agreed among themselves to restrict the use of sirens to real emergency cases based upon determination of need when the call for their services is made.

The California Highway Patrol recently advised all operators of private ambulances that their emergency vehicle permits would be revoked if they persisted in the illegal use of their sirens.

2. *Finding of Facts*

a. That the use of sirens in metropolitan areas has become a major source of disturbance in hospital zones to the extent that the hospital administrators complain that their patients are frequently unnecessarily disturbed.

b. That the Los Angeles Fire Department has reported an increase of 25 percent in accidents by its equipment in recent years, due to the use of sirens.

c. That insurance rates are higher on emergency vehicles that use sirens.

d. That there is evidence to support the belief that privately owned ambulances are major sources of the disturbances.

e. That some remedial action is now being taken by private ambulance operators and associations to restrict the use of sirens. Some effective steps taken are to:

1. Make additional charges to the patient when an emergency requiring the use of the siren is indicated.
2. Train their drivers not to use sirens unless a real emergency is stated.
3. Work for co-operation between the doctors and ambulance operators so that the driver will know when the call is an emergency one.

f. That the California Highway Patrol is conducting tests to determine the relative effectiveness of the siren versus the air horn.

g. That there is reason to believe that the emergency vehicle should be redefined in the California Motor Vehicle Code.

3. Recommendations

a. That the California Highway Patrol be requested to make recommendation to the Transportation and Commerce Committee for reviewing and redefining the emergency vehicle so that legislation may be introduced to amend the Vehicle Code.

b. That a resolution be offered for adoption cautioning ambulance operators against using their sirens except when actually making an emergency run.

c. That the California Highway Patrol be requested to complete their testing of the air horn as a possible substitute for the siren as an emergency warning signal and to report their findings to the Assembly Transportation and Commerce Committee at the earliest date practicable.

Chapter IX

MISCELLANEOUS MOTOR VEHICLE PROBLEMS

A. MOTOR VEHICLE REGISTRATION FEES: MODEL YEAR VERSUS YEAR OF FIRST PURCHASE AS BASIS FOR ASSESSING FEES

1. Background

Motor vehicle registration fees are now based on the year of first purchase rather than on the model year of the motor vehicle. "In lieu" taxes, that portion of the registration fee which varies with the assessed valuation of the vehicle, are reduced each year after purchase until the minimum of 5 percent of the valuation is reached. This is a gradual reduction schedule, beginning with 85 percent at the year of purchase, 70 percent for the second year, and so on until it lowers to 5 percent the ninth year after purchase and remains fixed at that evaluation. The owner is charged at the rate of 2 percent of the vehicle's assessed valuation. In addition, a flat feet of $8 is added regardless of the vehicle's age or value. This background is presented so that a better understanding of the problem may be had.

Under the present law persons who purchase a 1959 model car in 1958, for example, would pay on the basis of 85 percent of its value for the balance of 1958, 70 percent for registering in 1959, and so on until the minimum was reached. These owners represent approximately one-sixth of all car registrants in California, according to the Registrar of Motor Vehicles. The other five-sixths of new car purchasers—those who would buy in 1959—would pay on the basis of 85 percent of the valuation for that year. Their car would not reach the lowest valuation percentage until one year after those who purchased in 1958.

Under the amendment proposed by No. 1147, 1957 Legislative Session, "in lieu" taxes would be based on the model year rather than on the year of first purchase. Thus, owners of all motor vehicles of the same model year would be paying "in lieu" taxes based upon the same percentage of assessed value. Those who purchased their vehicle in 1958 would pay on the basis of 85 percent in both 1958 and 1959. This would, it was stated, be a more equitable way of assessing motor vehicle buyers, would simplify assessment procedures, and would increase the income to the State from registration sources.

This registration problem did not become an important one until car manufacturers began to put their new models on the market several months prior to the beginning of the calendar year.

The representative of the Automobile Club of Southern California presented the view that the auomobile users in California are already bearing a heavy tax burden. The proposed change in assessment procedures would add another $613,000 per annum to that burden. He stated further, that the present system of computing the assessments or "in lieu" taxes is equitable when related to the use of the vehicle.

Those vehicles which were purchased first would depreciate in accordance with the longer period of use.

A representative of the Los Angeles and Southern California Motor Car Dealers Association stated that the proposed method of computing "in lieu" taxes would be harmful to the automobile industry in California.

2. Finding of Facts

a. That there is evidence to support the department's contention that basing "in lieu" taxes of motor vehicles on the model year is more equitable than to compute them on the basis of the year first purchased and that record-keeping would be simplified if all 1959 motor vehicles were based on the model year.

b. The State would gain about $613,000 per annum in taxes based on the model year assessment plan.

c. Strong opposition to the proposed change was expressed by representatives of the Automobile Club of Southern California and the Automobile Dealers Association of Los Angeles and Southern California.

3. Recommendations

That no action be taken at this time.

B. GARAGEMEN'S LIEN LAW

1. Background

The present Possessory Lien Law adequately protects the garageman in obtaining the compensation to which he is legally entitled for services performed and materials furnished for any vehicle of a type subject to registration in this State provided the person for whom the services are performed is the legal owner of that vehicle.

This protection to the garageman does not automatically pertain if the person for whom the work is performed is not the legal owner of the vehicle. In such cases that portion of the possessory lien in excess of $100 is invalid unless the person holding the lien obtains the consent of the legal owner prior to the commencement of the work or services upon which the lien is based.

There is no provision in the Vehicle Code for vehicle ownership liens based upon garage repair work.

2. Lien Law Problems

This committee received requests to have two provisions of the vehicle code, pertaining to the garagemen's lien law, amended. These were:

a. Authorize a vehicle ownership type of lien in favor of garagemen in cases involving major repairs, etc. This would, it was stated, give the garageman protection he does not now have. It would permit him to release possession of the vehicle and be assured of payment of legal claims against it, whereas under the present law his best protection is his possession of the vehicle until all of his legal financial claims against it have been settled.

b. Increase the amount of the possessory lien from $100 to $500. This increase in the possessory lien would protect those garagemen who performed repair work before they learned that the vehicle's legal owner was some other person or agency. In such cases the legal owner could take possession of the vehicle on payment of $100 regardless of the amount of the legal obligation. The garageman's only recourse would be a civil action against the person who contracted for the work. Losses totaling about $15,000 a year have been sustained by the approximately 30 percent of garage owners who have been involved in cases of this sort.

When the ceiling of $100 was adopted in the lien law it was considered sufficient to cover the cost of most repair jobs. Since then the cost of labor and material have advanced in price, and the automobile has become so complicated, that $100 no longer serves as adequate protection to the garagemen. In at least one state, Michigan, the possessory lien has been increased to $400, it was stated.

3. Recommendations

a. This committee recommends no action on the proposal to authorize a vehicle-ownership type of lien for garagemen. The present lien law offers adequate protection to them if they comply with its provisions.

b. There is some justification for the request that the financial protection of the Possessory Lien Law be increased above the present $100 limit. The cost of labor and material has risen greatly since the $100 ceiling was adopted. While this committee believes that there is adequate financial protection in the present lien law for the larger, well-established garagemen who have learned from experience to obtain consent of the legal owner prior to undertaking a major repair job, consideration should be given to the needs of the smaller and newer entrepreneurs in the garage business by raising the basic financial protection from $100 to $200.

C. SNOW TREAD TIRES IN LIEU OF TIRE CHAINS

A request that the use of so-called "snow tread" tires be authorized in lieu of tire chains was considered by the committee.

Inspector Daniel J. O'Connell of the California Highway Patrol reported the results of extensive tests conducted by the National Safety Council and the California Highway Patrol to determine the safe stopping factor of several different tire and chain combinations.

With a motor vehicle driving down a road covered with glare ice at 20 miles per hour the stopping distances were:

Equipment	*Stopping distance*
Regular tires	195 feet
Snow tires	174 feet
Regular tire chains	99 feet
Reinforced tire chains	77 feet

No action was recommended by the committee.

D. COMPULSORY VEHICULAR INSPECTION

Some testimony was received favoring compulsory vehicular inspection in California. In their discussion of the amounts of automotive-induced smog, representatives of the Los Angeles Air Pollution Control District stated that motor vehicles which were regularly inspected and properly maintained produced lower percentages of the gaseous elements which produced smog than did those machines that were not properly cared for.

This is a problem that will have to be solved concurrently with any legislation requiring the installation of smog control devices on motor vehicles on a statewide basis.

E. FLASHING LIGHTS FOR RURAL LETTER CARRIERS

Representatives of the California Rural Letter Carrier's Association (United States Mail) requested that they be authorized to install flashing lights on the motor vehicles used by them in distributing mail. They alleged that the use of signal lights would assist them to return to the highway at night and expedite the delivery of mail.

Captain Jacobs of the California Highway Patrol stated that the Motor Vehicle Code permits the use of conspicuous stop lights and turn signals which have been found satisfactory by delivery vehicles, passenger buses, and other service vehicles. He stated that flashing lights create a hazard by encouraging drivers to park partially on the roadway.

No further action on this request is recommended.

F. RECODIFICATION OF THE CALIFORNIA MOTOR VEHICLE CODE

As the result of legislation adopted by the 1955 Session of the Legislature recodification of the California Motor Vehicle Code was authorized.

Work on this voluminous document, which is now ready for adoption, was performed by the Citizens Advisory Committee on Motor Vehicle Code Recodification for the Assembly Interim Committee on Transportation and Commerce.

Assembly Bill No. 5, which incorporates the new code, has been presented to the Assembly for adoption by its authors, Assemblymen Dahl and Luckel.

APPENDIX A-1

1957

Seattle (Wash.) Transit System: Utility Tax

City Council eliminated a 2 percent utility tax as of January 1, 1957, imposed a "revised flat charge" for services provided the transit system by other city departments. Estimated to save STS $100,000 annually. (Ordinance No. 85753.)

Springfield (Ill.) Transportation Co.: Franchise Tax

Company has been relieved of paying $3,900 in franchise taxes for 1957. (Source: Company letter dated February 24, 1957.)

Vermont (Statewide): License Fees

License fees ranging from $150 to $450 per bus have been reduced to $30 per bus effective with 1957 registrations. (Source: Letter from Burlington Rapid Transit Co., dated May 6, 1957.)

Safety Motor Transit Co. (Roanoke, Va.): Gross Receipts Tax

The gross receipts tax has been reduced from 4 percent to 2 percent, retroactive to January 1, 1957. (City Council Resolution No. 13032, adopted April 1, 1957.)

United Transit Co. (Providence, R. I.): Gross Receipts Tax

The 1¼ percent gross receipts tax "imposed for operation of a street railway" has been eliminated. (Source: *Passenger Transport*, May 10, 1957.)

Fort Wayne (Ind.) Transit, Inc.: Snow Removal

City has agreed to reimburse company for all labor costs, all sand, chemicals and trucks used in snow removal. (Source: Agreement signed January 8, 1957.)

Omaha (Neb.) Transit Co.: Occupation Tax

City Council eliminated 1¾ percent occupation tax, effective January 11, 1957. (Ordinance No. 19135.)

Chatham (Ont.) Coach Lines (Subsidy)

City Council has agreed to collect all revenues from fare boxes and to guarantee the company 44 cents per mile operated during the coming year. Estimated cost to the city will be approximately $15,000 per year. (Source: *Bus & Truck Transport*, March, 1957.)

Southern Coach Lines, Inc. (Chattanooga, Tenn.): Gross Receipts Tax and Seat Tax

Effective March 1, 1957, the Chattanooga City Commission eliminated the seat tax of $1.25 on each seat and the gross receipts tax of 2 percent on the first one million dollars and 3 percent on all over that figure. (Source: Company letter dated March 11, 1957.)

Columbus (Ga.) Transportation Co.: Franchise Tax

The city has waived some franchise taxes and the 25 percent income charge for intangible property amortization has been eliminated. (Source: Company letter dated March 20, 1957.)

Ohio (Statewide): License Fees

The vehicle license fee for privately owned bus companies has been reduced to $10 per bus, effective March 30, 1957. Previously, the fee was based on weight and averaged about $300 for each bus. (House Bill No. 153, amending Section 4503.04 of the Revised Code.)

Birmingham (Ala.) Transit Co.: Gross Receipts Tax

The city has waived the 3 percent receipts tax for a period of six months to enable the company to pay an 8 cents per hour wage increase which settled an 11-day recent strike. (Source: Copy of letter from Mayor J. W. Morgan dated April 10, 1957.)

Washington (Statewide): Motor Fuel Tax

Effective June 13, 1957, transit companies will be exempted from paying the 6½ cents per gallon state fuel tax. (Senate Bill No. 61, Chapter 292, Laws of 1957.)

West Virginia (Statewide): Seat-Mile Tax

Effective July 1, 1957, the seat-mile tax of one-thirtieth of one cent per seat mile will be eliminated. In place of the seat-mile tax, vehicle registration fees will be adjusted based on the gross weight of the bus. (House Bill No. 360, passed March 8, 1957.)

Iowa (Statewide): Motor Fuel Tax, License Fees and Compensation Taxes

Effective July 1, 1957, transit companies will be exempted from paying 6 cents per gallon motor fuel tax; bus registration fees ranging from $25 to $265 and compensation taxes ranging from $75 to $250 per bus will be reduced to a set fee of $25 per bus. (Source: *Passenger Transport,* May 10, 1957.)

Des Moines (Iowa) Transit Co.: Registration Fees and Gross Receipts Tax

Effective July 1, 1957, the $65 to $85 fee levied on trolley coaches in Des Moines and the 2¾ percent gross receipts tax will be eliminated. (Source: *Passenger Transport,* May 10, 1957.)

Minnesota (Statewide): Registration Fees

Bus registration fees, which ranged from $38 to $168, will be reduced on January 1, 1958, to $40 per bus for companies operating in cities with a population of 200,000 or more, $10 per bus in cities between 70,000 and 200,000 population, and $2 per bus in areas of less than 70,000 population. (S. F. No. 704, Chapter 961, amending Minnesota Statutes 1953, Sec. 168.013, Subdivision 1, dated April 29, 1957.)

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ASSEMBLY INTERIM COMMITTEE REPORTS
1957-1959

VOLUME 4 NUMBER 5

REPORT OF THE

SUBCOMMITTEE OF THE REVENUE AND TAXATION COMMITTEE ON PUBLIC INDEBTEDNESS

Pertaining to

THE COST OF PUBLIC FINANCING FOR NECESSARY NEW AND EXPANDED FACILITIES ON THE STATE AND LOCAL LEVEL

MEMBERS OF THE SUBCOMMITTEE

S. C. MASTERSON, *Chairman*

CARL BRITSCHGI HERBERT R. KLOCKSIEM
LEVERETTE HOUSE ALAN PATTEE

MARY VIRGINIA DAVIS, *Secretary*

April, 1959

Published by the
ASSEMBLY
OF THE STATE OF CALIFORNIA

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HON. CARLOS BEE
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Minority Floor Leader

ARTHUR A. OHNIMUS
Chief Clerk

LETTER OF TRANSMITTAL

April 7, 1959

Hon. Ralph M. Brown
Speaker of the Assembly, and
Members of the Assembly
Assembly Chamber, Sacramento

Gentlemen: In compliance with the provisions of House Resolution No. 305, directing the Assembly Interim Committee on Revenue and Taxation to investigate, ascertain, study and analyze all facts relative to the subject matter of Assembly Constitutional Amendment No. 46, adopted June 12, 1957 Regular Session of the Legislature, the Subcommittee on Public Indebtedness appointed for this purpose does herewith respectfully submit its report with the findings and recommendations of the committee.

Very truly yours,

S. C. Masterson, Chairman
Subcommittee on Public Indebtedness
of the Assembly Interim Committee
on Revenue and Taxation

Carl Britschgi, Member
Leverette House, Member
Herbert R. Klocksiem, Member
Alan Pattee, Member

APPRECIATION

Especial thanks is due to the members of the Subcommittee on Public Indebtedness, Assemblyman Britschgi, House, Klocksiem and Pattee, and to our Secretary, Mary Virginia Davis. for their faithful attendance and the extensive study they gave to this complex problem.

Our thanks are also extended to the Legislative Counsel and his staff for preparation of the charts on special district bonding requirements.

The sergeants-at-arms are to be commended for the intelligent and courteous manner in which they handled our meetings and for the excellent recordings that were made of our hearings.

HOUSE RESOLUTION NO. 305

Relative to An Interim Study of Assembly Constitutional Amendment No. 46

WHEREAS, This State is enjoying a population growth of unprecedented magnitude which has resulted in ever-increasing needs for new and expanded facilities both on the state and local level; and

WHEREAS, The present cost of obtaining funds in combination with this demand for needed construction programs has emphasized the great importance of obtaining public financing at the lowest possible cost in order to keep taxes at the lowest possible level; and

WHEREAS, The credit of the State of California and of its various subdivisions must be protected if the needs of the State are to be satisfied without burdensome taxation and other charges for unnecessarily expensive methods of financing; and

WHEREAS, The subject matter of Assembly Constitutional Amendment No. 46 which has been referred to the Rules Committee for assignment for interim study has instituted discussion which may be instrumental in pointing the way toward a solution of these difficult financing and taxation problems; now, therefore, be it

Resolved by the Assembly of the State of California, That the Interim Committee on Revenue and Taxation is authorized and instructed to investigate this subject and to ascertain, study and analyze all facts relative to the subject matter of said measure and to report the result of its investigation to the Legislature not later than the fifth legislative day of the 1959 Session thereof; and be it further

Resolved, That the said committee is allocated the sum of nine thousand dollars ($9,000) from the Contingent Fund of the Assembly for the purpose of making such study and report.

PREFACE

The Assembly Revenue and Taxation Subcommittee on Public Indebtedness was created by House Resolution No. 305 as a result of the introduction of Assembly Constitutional Amendment No. 46 at the 1957 Session of the Legislature.

That measure would have redefined public indebtedness to include "lease-purchase" agreements and revenue bonds and would have subjected such arrangements to the requirement of a vote of the people. While broadening the definitions of indebtedness to include matters not now subject to the Constitutional requirement of a vote, the measure would have reduced the vote required from 66⅔ percent to 60 percent for general obligation bonds.

It was disclosed that at the present time, many public agencies do not come within the debt limitation provisions of Section 18 of Article XI of the State Constitution and that those agencies which do, had been able, because of the looseness of the definition of "indebtedness", to evade the requirement of a vote before committing tax funds to the repayment of long-term obligations.

Also it was disclosed that interest rates on those obligations incurred without a vote are considerable higher than the interest rate on bonds voted by the people, and thus impose an additional burden upon the taxpayer without his consent. The time available for hearings at the regular session of the Legislature was insufficient to permit a complete investigation of the subject matter and the measure was referred for interim study.

The interim committee has held hearings in Los Angeles, Fresno, Richmond and San Diego which were widely publicized and well attended by representatives of public agencies, banking and lending institutions, real estate, taxpayers, farmers and other groups and associations.

S. C. Masterson

DISCUSSION OF THE PROBLEM

To secure to the people the power to determine whether their tax funds should be committed to the payment of long-term indebtedness Article XI, Section 18 of the California Constitution adopted in 1879 provided:

> *Municipal Debt Incurred in Any Year Not to Exceed Income—Exceptions*
>
> SECTION 18. No county, city, town, township, board of education, or school district, shall incur any indebtedness or liability in any manner or for any purpose exceeding in any year, the income and revenue provided for such year, without the assent of two-thirds of the qualified electors thereof, voting at an election to be held for that purpose, nor unless before or at the time of incurring such indebtedness provision shall be made for the collection of an annual tax sufficient to pay the interest on such indebtedness as it falls due, and also provision to constitute a sinking fund for the payment of the principal thereof, on or before maturity, which shall not exceed 40 years from the time of contracting the same; provided, however, anything to the contrary herein notwithstanding, when two or more propositions for incurring any indebtedness or liability are submitted at the same election, the votes cast for and against each proposition shall be counted separately, and when two-thirds of the qualified electors, voting on any one of such propositions, vote in favor thereof, such proposition shall be deemed adopted.

One thing that is immediately apparent from reading the section is that it is limited in its application to cities, counties and school districts. Undoubtedly the framers of the Constitution of 1879 were of the opinion that this classification would sufficiently cover the bodies politic that could exercise the taxing power. Certainly they did not contemplate the extensive and increasing system of districts and authorities under which we live today. These local special districts total in the aggregate in California, more than 5000. Each has the power to create long-term, tax-secured obligations. Yet none of them are subject to the limitations of Section 18 of Article XI of the Constitution. In the appendix of this report appears a series of charts indicating the kinds of districts now existing in California and the statutory regulation governing the issuance of general obligation bonds by each of them. It will be noted that these vary from district to district. There was general agreement amongst those testifying before the committee that all districts should be subject to the same constitutional provisions concerning the incurring of long-term indebtedness.

It is the evident intent of Section 18 of Article XI to require that each year's revenues should pay each year's expense, and that no claim upon one year's revenue should be a charge on the revenue of future years unless assented to by two-thirds of the qualified voters casting their ballots in favor thereof at an election held for the purpose of determining whether or not the required percentage agreed that the indebtedness should be incurred. Irrespective of the evident intent controversy has often arisen over the specific meaning of the constitutional language and the courts have been called upon to define just what is within and what is not within its prohibitions.

Examples of types of indebtedness judicially determined to fall within Section 18 of Article XI, as it now reads are as follows:

Any city obligation payable from a special fund constitutes an "indebtedness" within Section 18, of Article XI when the city is obligated directly or indirectly to feed the special fund from general revenues (*Garnett* v. *Swanton,* 216 Cal. 220).

City's obligation to pay assessments on city-owned property for improvement constitutes an "indebtedness" (*City of Pasadena* v. *McAllaster,* 204 Cal. 267).

An acceptance by a city of a deed of land "for and in consideration of the covenants and conditions" expressed therein, which were to the effect that the land should revert to the grantors unless the city should expend not less than $5,000 each year in improving it as a park, total cost of improvements being estimated at $50,000, created a "liability" to the grantors for the entire consideration of $50,000 within the scope of Section 18 of Article XI (*Chester* v. *Carmichael,* 187 Cal. 287).

Indebtedness arising from the purchase of property or services (*Tehama County* v. *Sisson,* 152 Cal. 167).

A claim under a contract between an undertaker and a board of supervisors under which the undertaker was to bury the indigent dead for the fiscal year at a certain sum for each burial is within Section 18 and cannot be paid from the income of a succeeding year (*Pacific Undertakers* v. *Widber,* 113 Cal. 201).

The purchase of a road working equipment under a conditional sales contract is within the section (*Stockton Morris Plan Co.* v. *California Tractor and Equipment Corp.,* 112 Cal. App. 2d 684).

A contract for lease of trucks to town for 26 months at stated rental, on payment of which in installments with interest on defined payments lessor was to execute bill of sale, was contract of sale postponing time of payment beyond fiscal year in which signed, in violation of Section 18, and hence not enforceable by seller (*McFayden* v. *Town of Calistoga,* 74 Cal. App. 378).

Agreement to acquire land and buildings for public uses, though denominated a lease, by which city bound itself to pay two bond issues of lessor, and to exercise an option to purchase property, or forfeit certain payments, which it was required to make under agreement, and use of property and property itself, created a liability in violation of Section 18 (*City and County of San Francisco* v. *Boyle,* 195 Cal. 426).

When an agreement giving a city an option to purchase, creates a full and complete liability with execution, or if its designation as a lease is a subterfuge, and it is actually a conditional sales contract in which rentals are actually installment payments on the purchase price for the aggregate of which immediate indebtedness or liability exceeding the constitutional limitation arise, and the installments are to be paid out of the city's ordinary revenue and income the contract is void (*Los Angeles* v. *Offner,* 19 Cal. 2d 483).

Any assumption by a school district, not included in a high school district, of a pro rata of bonded indebtedness originally created by such high school district is, as to such school district, the incurring of an indebtedness or liability (*People* v. *Hanford Union High School District,* 148 Cal. 705).

Examples of types of indebtedness judicially determined to be outside the scope of Section 18 of Article XI, as it now reads, are as follows:

Revenue producing improvement bonds payable out of the revenue of proposed or existing improvements are not within the contemplation of Section 18 (*Oxnard* v. *Dale,* 45 Cal. 2d 729).

An indebtedness payable solely from a special fund if the city, county, or school district is not obligated directly or indirectly to feed the special fund from general revenues (*Department of Water and Power of the City of Los Angeles* v. *Vroman,* 218 Cal. 206; *Garnett* v. *Swanton,* 216 Cal. 220).

An indebtedness of a city in violation of Section 18 is not created by assessment on city lands not used in the performance of public function (*Southlands Co.* v. *City of San Diego,* 211 Cal. 646).

A lease of land to a city at an annual rental for a term of years for a municipal airport with option to purchase does not create an "indebtedness" for future rentals within the section (*Krenwinkle* v. *City of Los Angeles,* 4 Cal. 2d 611).

Section 18 refers only to acts or contracts of a city, not to liabilities imposed by law, as for maintaining streets (*Federal Const. Co.* v. *Wald,* 30 Cal. App. 360).

Costs required to be paid by a city for abandoning eminent domain proceedings are not within the section (*Mills* v. *Houck,* 124 Cal. App. 1).

An obligation imposed by law upon a city or county is not an indebtedness within Section 18, such as an indebtedness incurred by a county in providing a new county courthouse when the law requires the county to provide adequate quarters for superior and municipal court judges (*Los Angeles County* v. *Byram,* 36 Cal. 2d 694).

The obligation of a county to repay an illegal tax paid under protest is an obligation imposed by law so that an application for mandamus to compel the levy of a tax to pay a judgment for a refund to the illegal tax does not seek to compel the county to incur an indebtedness in violation of Section 18 (*Oscar Heyman & Bros.* v. *Bath,* 58 Cal. App. 499).

A loan contract between the Housing Authority of the County of Los Angeles and the United States Housing Authority, by which the former agreed to sell and the latter to buy bonds issued by the

local authorities which were payable solely out of housing project revenues and any annual contributions made by the federal authority did not violate Section 18 (*Housing Authority of Los Angeles County* v. *Dockweiler,* 14 Cal. 2d 437).

Section 18 has no application to the liability of a city for the salary of a municipal officer whose office has been created, and whose salary has been fixed, by statute since such liability is established by the Legislature and is not incurred by the city (*Lewis* v. *Widber,* 99 Cal. 412).

Section 18 is not violated by an agreement for the leasing of city land for 10 years at a nominal rental, the construction of an incinerator thereon by lessee, and the leasing of the incinerator to the city for a specified amount with an option to purchase, where the transaction is really a lease with an option, the city has no present intention to purchase and is not required to exercise the option to protect the prior investment of rental payments and where the amount of the rentals to be paid in a single fiscal year together with other debts and liabilities of the city, will not exceed the income and revenue for such year (*City of Los Angeles* v. *Offner,* 19 Cal. 2d 483).

That these judicial determinations have not been reached without difficulty is perhaps most clearly shown in the majority and dissenting opinions in the fairly recent case of *Dean* v. *Kuchel* (35 C. 2d, 444), which involved Section 1, of Article XVI rather than Article XI, Section 18 but which dealt with the same principle of law.

In that case the Legislature had authorized the Director of Finance to enter into lease provisions for public buildings for terms of up to 40 years with the condition that the title was to vest in the State at the end of the term of the lease. The Director of Finance entered into such a lease requiring payments in a total amount in excess of $300,000. It was contended that this violated Section 1 of Article XVI which limits the amount of state debt that can be incurred without a vote to $300,000.

In holding there was no violation of the constitutional limitation the court said:

> "We find no logical distinction between the Offner case and the one at bar. It is true there was an option to purchase in the former rather than a vesting of title at the end of the term as in the instant case, but as far as liability is concerned, the State under this instrument is in a better position, for it gets title without the payment other than a rental."

But Justice Edmunds in his strong dissenting opinion had this to say about the purported "lease":

> "In my opinion, even the most liberal construction of the contract which this court is asked to approve shows that the transaction is a subterfuge and therefore void within the rule applied in *City of Los Angeles* v. *Offner*. . . . The total 'rental' for the building exceeds the forbidden amount, and the company in fact retains title to the 'demised' premises for security purposes only. Such reservation is the oustanding characteristic of a contract of conditional sale . . . "

From the decided cases it appears that several "theories" or "doctrines" to avoid the constitutional limitation have evolved. Although much lip service has been paid to the sound public policy embodied in Article XI, Section 18, nevertheless the provision has been gradually weakened and its extent limited until it provides almost no barrier at all to those who feel the need of evading its restrictions.

The first of these theories is sometimes referred to as the doctrine of "involuntary obligations". Under this theory the courts have decided that Article XI, Section 18 is confined in its application to those forms of long-term indebtedness created by the voluntary action of the local legislative body and that it does not apply to an obligation imposed by law or arising out of tort. (See: *Los Angeles County* v. *Byram,* 36 C. 2d, 694, 227 P. 2d. 4; *City of Long Beach* v. *Lisenby,* 180 C. 52; 179 P. 198.)

The second of these theories is the so-called "special fund" doctrine. Under this theory where a special fund exists from which obligations can be paid and recourse to the General Fund may not be had directly the prohibitions of Article XI, Section 18 do not apply. (See: *City of Oxnard* v. *Dale,* 45 C. 2d 729, 290 P. 2d 859, overruling *Garnet* v. *Swanton,* supra, insofar as that case held that an indirect resort to the General Fund was invalid).

Similar in nature is the device known as the "revenue bond". When an improvement is desired by the legislative body which it feels might fail if put to a vote of the people or which might be precluded because the debt limitation of the entity had been reached a bond is issued which is payable solely out of the revenues of the improvement, as for example, the revenue from a municipal power plant or from a sewer charge. However, it should be noted that if these revenues were not devoted to paying for the improvement they would accrue to the General Fund and would thus be reflected in a lower property tax rate. (Cf: *City of Oxnard* v. *Dale,* supra).

Another device, commented upon earlier, is that of so-called "lease-purchase" or lease with option to purchase. (See: *City of Los Angeles* v. *Offner,* supra, and *Dean* v. *Kuchel,* supra.) In connection with this method of financing long-term improvements without a vote of the people, should be mentioned the ready source of funds made available by the large growth of governmental retirement funds in the past few decades. The Retirement Fund is built up out of joint contributions from the salaries of governmental employees and tax money from the local governmental agency. Then the legislative body of the governmental agency contracts with the trustees of the retirement fund to have them build or buy some improvement or property which in turn the local governmental agency "leases" for a term after which it becomes the owner.

Following is a listing of the properties of the Los Angeles County Retirement Fund:

PROPERTY BELONGING TO THE RETIREMENT ASSOCIATION UNDER LEASE TO THE COUNTY OF LOS ANGELES

1. Western Avenue Golf Course (1953)		$1,170,000
2. Central heating and refrigeration plant (1956)		4,370,929
Land	$961,000	
Building	3,409,929	
3. Hall of Administration (1955)		28,329,352
Land	$2,313,650	
Excavation	681,671	
Foundations	270,561	
Structural steel	3,437,470	
General contract	20,467,000	
Architects fees	1,159,000	
4. Hall of Records (1958)		12,577,000
Land	$2,225,000	
Building	10,352,000	
5. Proposed—men's jail facility		21,000,000

3—L-4300

COUNTY OF LOS ANGELES

PROPERTY LEASED WITH OPTION TO PURCHASE—NOT INCLUDING LEASES WITH BOARD OF RETIREMENT

	Lease period	*Rental rate*	*Option price and time*
Diamond Bar Golf Course	7/1/58— 6/30/78	$36,498.74—year	$695,214.05—any time
Willowbrook Health Building	10/1/53— 9/30/73	285.00—month	7,800.00—after 20 years
Welfare Building	1/1/54—12/31/73	20,300.00—month	540,000.00—after 20 years
Health Building	3/25/52— 3/24/72	6,238.75—month	527,875.00—after 15 years 162,250.00—after 20 years
Alhambra Municipal Court	7/ 1/51— 6/30/71	1,036.67—month	59,000.00—after 20 years
Knollwood Country Club	11/10/58— 11/9/83	2,250,000.00 payable at the rate of $90,000 per year	1,500,000.00—option price to be reduced at the rate of 1/10 of 1 percent per month
Assessor's Building	2/9/54—11/30/65	36,537.67—month until 2/8/64 22,900.00—month effective 2/9/64	1,500,000.00—after 10 years

Prepared by Auditor-Controller, December 26, 1958

The foregoing constitutes approximately one-half of the long-term indebtedness of the County of Los Angeles.

It should be remembered that these long-term obligations were incurred without any vote by the people and that they are a direct obligation of the general fund of the county incurring them and thus will be reflected in the tax rate. In many cases "lease purchase" arrangements of this type have been made after the voters have refused to pass bond issues for the purpose. The vice of these methods of financing is not just that a vote of the people is avoided (or even ignored) but also that they are more expensive than general obligation bond financing. Every expert testifying on the subject stated that the effective interest rate on each of these nonorthodox methods of financing was at least one percent higher than on general obligation bonds. It was also pointed out that the increasing amount of these non-voter-approved long-term obligations was going to have an adverse effect upon *all* municipal bonds in California resulting in higher interest charges upon general obligation bonds as well as the others.

Those who resort to these methods of non-voter-approved financing justify their action upon the ground that the present constitutional two-thirds vote requirement is too stringent and too often results in the failure of a much needed and perhaps essential improvement. They point out that the percentage of property owners has greatly increased since 1879 and that property taxes no longer constitute the principal source of revenue for local government. They contend that they are most desirous of using the cheaper general obligation bond method of financing but that the present two-thirds vote requirement forces them to use the more expensive "lease-purchase" and "revenue bond" methods of financing if they are to get anything done at all.

It was also pointed out that "lease-purchase" may be the most acceptable and less expensive method of financing where the contract, while for more than one year, is still relatively "short-term" in nature. Likewise it was pointed out that true leases, where the rental is only an annual obligation for the use of the property, often give the lessee an option which may be of advantage to exercise. However, such leases are usually for shorter terms than those used to evade the constitutional restrictions.

SUMMARY

Taxation is a problem comprising many factors; each of which has many ramifications and complexities. One of these factors in the tax picture, and a very important one, is the incurring and financing of long-term public debt.

At present, Article XI, Section 18 of the Constitution of California regulates the incurring of long-term indebtedness by cities, counties, and school districts. Intended as a bulwark against the extravagant and unwise commitment of tax funds to sometimes questionable public improvements, the constitutional provision has become a sieve through which our tax funds flow for the most part without let or hindrance.

There can be no doubt that the intent of those who wrote the provision in 1879 was to require each year's expenses to be paid out of the revenues for that year, and that no expenses should be chargeable

against the revenue of future years unless approved by a vote of two-thirds of the electors voting on the proposition. Such was the intent; however, it has worked out differently in practice.

In the first place, Article XI, Section 18 limits only cities, counties, and school districts. In 1879, these were the only local agencies of government which could incur an indebtedness payable from general tax funds. However, since that time, there has developed by legislative permission more than 100 different kinds of special districts having the power to tax and to incur long-term indebtedness. These local special districts total in the aggregate in California, more than 5,000. *None of them are subject to the limitations of Article XI, Section 18!* Yet each has the power to create long-term, tax-secured obligations which the property owner is required to pay.

Secondly, methods have been devised by the agencies subject to the constitutional provision to evade its limitations. Chief among these is the so-called "lease-purchase" agreement under which a public improvement is purchased over an extended period under the guise of a lease with an option to buy. *No vote of the people who foot the bill is required.* Generally such arrangements are more expensive to the taxpayer—interest charged on the deferred payments usually exceeds that charged on general obligation bonds by one percent or more.

The restraining effect of the constitutional provision has been further loosened by the "special fund" doctrine and its extent limited by the "involuntary-obligations" theory. Likewise, "revenue bonds" have been held not to fall within the purview of Article XI, Section 18.

Resort to these more expensive methods of financing has been forced upon the legislative bodies of local government in many instances because of the present stringent constitutional requirement of a two-thirds vote in order to obtain approval of the less expensive general obligation bond method of financing.

If the people are to have the power to determine whether their tax funds shall be committed to the payment of long-term indebtedness, as was the original intent of Article XI, Section 18 of the Constitution, then it is obvious that this provision must be redrafted.

FINDINGS

On the basis of the hearings held, the committee finds that:

1. Local governing boards faced with the need for public improvements and fearful of the results of an election requiring approval of two-thirds of those voting, have evaded the constitutional restriction by resort to "lease-purchase", "special fund", and "special district" arrangements which avoid the requirement of voter approval. Sometimes this has been done after voter disapproval of a bond issue. Such financing methods are more expensive to the taxpayer than general obligation bonds.

2. Most of the witnesses appearing before the committee had no conception of what a fraction-of-a-percent increase in bond interest rates could do in dollars and cents toward skyrocketing the price of bond financing; yet experts advise that an increase of one-quarter of one person in the interest rate upon the bonds now authorized and unsold in California would result in increased costs to the taxpayer of more than $100,000,000 over the life of the bonds.

3. The majority of those adhering to the two-thirds vote requirement do not regard the lease-purchase method of financing used by so many cities and counties as an obligation to be reckoned with in evaluating the credit rating of the State. Investment experts advise that such persons are mistaken in their belief. That in fact; resort to "lease-purchase" not only results in higher interest charges on the lease-purchase transaction, but also adversely affects the market for general obligation bonds. These experts agree that lowering the voting requirement to 60 percent and including "lease-purchase" and special districts within the constitutional limitation would improve the market for California bonds with a resultant tax saving.

4. All special districts should be subjected to the same uniform debt limitation and vote requirement as are cities, counties, and school districts.

5. California's credit rating (very high in the past) is being slowly, but surely lowered because local-level governing boards are resorting to methods of evading the constitutional limitation in order to finance public projects without a vote of the people.

6. With the huge volume of financing that faces California in the very near future, preventive measures must be taken to insure the maintenance of the State's credit rating, to protect the taxpayer from local governing boards creating unnecessarily expensive long-term obligations without voter approval, and to guarantee State progress with sound financial policy. This can only be done by amending Section 18 of Article XI of the Constitution of California.

RECOMMENDATIONS

It is recommended that Section 18 of Article XI of the Constitution be amended to accomplish the following:

1. To eliminate the prohibition against any "county, city, town, township or board of education" from incurring any indebtedness not payable out of the revenues provided for that year except upon approval by 66⅔ percent of the votes cast on the proposition, and substitute therefor a prohibition against the incurring of any such indebtedness by any city, county, school district, *or other public district* except upon the approval thereof by 60 percent of the votes cast on the proposition for incurring such indebtedness. This would mean that in cases of cities, counties and school districts, the required number of votes to approve a bond issue would be reduced from 66⅔ percent to 60 percent, but the requirement would be made applicable to the issuance of any general obligation bonds payable from taxes by any public district or public corporation.

2. To define indebtedness or liability so as to include an indebtedness or liability incurred under so-called lease-purchase arrangements if extending over a period of more than 10 years.

3. To make it clear that if an indebtedness is to be paid from ad valorem taxes or from sales or use taxes it shall be deemed a general obligation within the meaning of the constitutional provision and shall not be deemed payable from a special fund as that term has been used by the courts.

4. To provide that revenue bonds or obligations payable from a special fund and maturing more than five years from the date the obligation is incurred shall not be issued without the approval of a majority of the votes cast on the proposition. This limitation, however, should not be applicable in any case in which a city or county charter authorizes the issuance of revenue bonds without a vote of the people.

5. The section should not apply:

(a) To any indebtedness incurred with the United States or any agency of the United States;

(b) To the issuance of bonds to refund an outstanding bond issue constituting a general obligation;

(c) To an indebtedness payable exclusively from so-called "excess" taxes in a redevelopment project;

(d) To obligations incurred in operating a public utility and incurred in the ordinary course of business of operating such utility;

(e) To the incurring of an indebtedness payable within five years representing the purchase price of personal property.

6. The amendment should also contain a special provision relating to newly organized public agencies and permitting the incurring of an indebtedness not exceeding the income and revenue for the first year with a vote of the people.

PROPOSED LEGISLATION

The committee recommends the adoption of the following constitutional amendment:

CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

Assembly Constitutional Amendment No. 38

Introduced by Messrs. Masterson, House, Britschgi, and Pattee

March 26, 1959

REFERRED TO COMMITTEE ON CONSTITUTIONAL AMENDMENTS

Assembly Constitutional Amendment No. 38—A resolution to propose to the people of the State of California an amendment to the Constitution of the State, by amending Section 18 of Article XI thereof, relating to local government.

Resolved by the Assembly, the Senate concurring, That the Legislature of the State of California at its 1959 Regular Session commencing on the fifth day of January, 1959, two-thirds of the members elected to each of the two houses of the Legislature voting therefor, hereby proposes to the people of the State of California that the Constitution of the State be amended as follows:

First—That Section 18 of Article XI thereof be amended to read:

SEC. 18. No county, city, ~~town, township, board of education, or~~ school district *or other public district or public corporation having limited and defined territorial limits, hereinafter collectively referred to as public agencies*, shall incur any

LEGISLATIVE COUNSEL'S DIGEST

A. C. A. 38 as introduced, Masterson (C. A.). Incurring indebtedness by public agencies.

Amends Sec. 18, Art. XI, Cal. Const.

Requires a 60 percent, rather than a 66⅔ percent, favorable vote by the electors on the incurring of indebtedness by a county, city, or school district. Extends application of the requirement to any other public district or corporation having limited and defined territorial limits. Requires a majority vote to authorize the issuance by such public agencies of revenue bonds or obligations payable from a special fund. Makes certain exceptions from above provisions and defines various terms.

Effective on the 91st day after adjournment of the 1961 Regular Session.

indebtedness or liability in any manner or for any purpose exceeding in any *fiscal* year the income and revenue provided for such year, without the assent of ~~two-thirds~~ *60 percent* of *votes cast* by the qualified electors thereof, voting *on a proposition for the incurring of such indebtedness or liability submitted at any election at which such electors are entitled to vote* ~~at an election to be held for that purpose~~, nor unless before or at the time of incurring ~~such~~ *any* indebtedness *or liability payable from taxes or ad valorem assessments* provision shall be made for the collection of ~~an annual tax~~ *taxes or ad valorem assessments* sufficient to pay the interest on such indebtedness *or liability* as it falls due, and also ~~provision to constitute~~ *sufficient to provide* a sinking fund for the payment of the principal thereof, on or before maturity, which shall not exceed 40 years from the time of contracting the same; ~~provided, however, anything to the contrary herein notwithstanding.~~ *provided, however, that any newly organized public agency which has the power to levy an ad valorem tax or assessment upon real property may, during the period beginning with the date of organization and ending at the end of the first fiscal year in which such public agency may first levy such tax or assessment, incur without such assent indebtedness or liability which does not exceed the income and revenues provided for such period; and provided, that any public agency without such assent, if otherwise authorized by law or charter provision, may incur an indebtedness payable within five years representing the purchase price of personal property.*

~~when~~ *When* two or more propositions for incurring any indebtedness or liability are submitted at the same election, the votes cast for and against each proposition shall be counted separately, and when ~~two-thirds~~ *60 percent* of the qualified electors, voting on any one of such propositions, vote in favor thereof, such proposition shall be deemed adopted.

Wherever hereinbefore used in this section the term "indebtedness or liability" shall have the same meaning as the meaning of that term in this section as it existed prior to this amendment except that "indebtedness or liability" shall include any lease (other than a lease the rentals under which are payable from a special fund) under which the public agency is a lessee and which extends for a term exceeding 10 years and under which the public agency has a right, by option or otherwise, to acquire ownership of the property leased, and except that a fund created or maintained, in whole or in part, from ad valorem property taxes, ad valorem assessments or sales or use taxes shall not be deemed to be a special fund within the meaning of the special fund doctrine.

No public agency shall incur any indebtedness or liability represented by revenue bonds or other obligations payable from a special fund and maturing more than five years from the date the indebtedness or liability is incurred without the assent of a majority of the votes cast by the qualified electors

thereof voting on a proposition for the incurring of such indebtedness or liability submitted at any election at which such electors are entitled to vote; provided, however, that any charter city or charter county may, to the extent expressly authorized by its charter, incur without such assent any such indebtedness or liability represented by revenue bonds or other obligations payable from a special fund.

This Section 18 does not apply to any contract between any public agency and the United States or any agency thereof or to any indebtedness of a public agency to the United States or any agency thereof; nor to any indebtedness incurred by a public agency for the purpose of refunding an already outstanding indebtedness constituting a general obligation of the agency; nor to any indebtedness payable exclusively from that portion of taxes as defined in paragraph (b) of Section 19 of Article XIII of the Constitution levied by any taxing agency upon property in a redevelopment project, nor to an obligation incurred by any public agency operating a public utility to make refunds of sums advanced by patrons for extensions and facilities or incurred by such public agency in the ordinary course of business of operating such utility.

The provisions of this amendment shall not invalidate any bonds of any public agency which were authorized pursuant to law before although issued after this amendment becomes effective.

This amendment shall not become effective until the ninety-first day following the adjournment of the 1961 Regular Session of the Legislature.

APPENDIX

I. ANALYSIS OF CALIFORNIA DISTRICT BONDING LAWS

A. Water Districts—General Law
B. Water Districts—Special Law
C. Fire and Police Protection Districts
D. Harbor Districts
E. Health and Safety Districts
F. Streets and Highways Districts
G. Miscellaneous Districts—General Law
H. Miscellaneous Districts—Special Law

II. SUMMARY ANALYSIS OF HEARINGS ON PUBLIC INDEBTEDNESS

A. Los Angeles—December 3, 1957
B. Fresno—January 9, 1958
C. Richmond—May 23, 1958
D. San Diego—September 12, 1958
E. Los Angeles—December 30, 1958

I. AN ANALYSIS OF CALIFORNIA DISTRICT BONDING LAWS

A. WATER DISTRICTS (GENERAL LAW)

BONDS

	General obligation		Refunding		Revenue		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
Community Service Districts—Government Code Secs. 60000-60891	Yes	Two thirds	Yes	Majority	Yes	Majority	Yes (short term note).	Funded indebtedness may not exceed 20% assessed value.
County Drainage Districts—Water Code Sections 56000-56146	Yes	Two thirds.	—		—		—	Not to exceed 15% of assessed value of taxable real property.
County Flood Control Districts—Water Code Sec. 8110	—		—		—		—	
County Recreation Districts—Public Resources Code Secs. 5431-5467*	Yes	Two thirds.	—		—		—	Trustees may borrow up to 25% of prior years' taxes.
County Water Authorities—1943:545:2090, D.A. 9100	Yes	Two thirds.	—		—		—	Limit of 15% assessed value.
County Water Districts—Water Code Secs. 30000-33901	Yes	Two thirds.	Yes	Majority.	Yes	Two thirds or majority.	Yes	Warrants limited to formation expense.
County Waterworks Districts—Water Code Secs. 55000-55991	Yes	Majority.	Yes	Majority'	Yes	Majority.	—	Zone bonds by 60% vote.
Drainage Districts of 1885—1885:158:204, D.A. 2200	—		—		—		—	
Drainage Districts of 1903—1903:238:291, D.A. 2202	Yes	Majority.	Yes	Two thirds.	—		Yes	Organizational warrants limited to $2,000.
Drainage Districts of 1919—1919:354:731, D.A. 2203	Yes	Order of board.	—		—		—	
Flood Control and Flood Water Conservation Districts—1931:641:1369, D.A. 9178	—		—		—		—	
Irrigation Districts—Water Code Secs. 20500-29978	Yes	Two thirds or majority.	Yes	Majority.	Yes	Two thirds or majority.	Yes	

Levee Districts—1905:310:327, D.A. 4284	Yes	Majority.	—		—		—	
Metropolitan Water Districts—1927:429:	Yes	Majority. or two thirds vote of the Board.	Yes	Vote of board of directors.	—		Yes	Limitation of 15% of assessed value.
Municipal Utility Districts—Public Utilities Code Secs. 11501-14509	Yes	Two thirds.	Yes	Two thirds. of board.	Yes	Majority.	—	Limited to 20% of assessed value.
Municipal Water Districts of 1911—1911: 671:1290, D.A. 5243	Yes	Two thirds.	—		Yes	Majority	Yes	Interest warrants limited to formation expenses. Also short-term notes.
Municipal Water Districts of 1935-1935: 78:423, D.A. 9131	Yes	Two thirds.	—		—		—	
Park, Recreation and Parkway Districts, Public Resources Code Secs. 5630-5667*	Yes	Two thirds.	—		—		Yes	
Protection Districts of 1895—1895:201: 247, D.A. 6174	—		— (see misc.)		—		—	May issue bonds to fund or refund indebtedness under Stats. 1897, Ch. 266, p. 424; D.A. 4287.
Protection Districts of 1907—1907:25:16, D.A. 6175	Yes	Majority.	Yes	Two thirds.	—		Yes	Unsold bonds destroyed by two thirds vote.
Public Utility Districts—Public Utilities Code Secs. 15501-17776	Yes	Two thirds.	Yes		Yes	Two thirds.	—	May not exceed 20% of assessed value. 6% evidence of indebtedness limit of 6% assessed value on catastrophe.
Reclamation Districts—Water Code Secs. 50000-53900	Yes	Majority.	Yes	Majority.	—		Yes	
Recreation, Park and Parkway Districts, Public Resources Code Secs. 5400-5428*	Yes	Two thirds.	—		—		—	
Recreation and Park Districts—Public Resources Code Sections 5780-5787.4	Yes	Two thirds.	—		—		Yes	
Regional Park Districts—Public Resources Code Secs. 5500-5595	Yes	Two thirds.	—		—		—	Debt limit of 5% of assessed value of real and personal property.
Regional Shoreline Park and Recreation Districts—Public Resources Code Secs. 5680-5777*	Yes	Two thirds.	—		—		—	

BONDS—Continued

	General obligation		Refunding		Revenue		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
Resort Districts—Public Resources Code Secs. 10000-12164	Yes	Majority.	—		—		Yes	If district formed in certain manner may use Improvement Act of 1911 and Improvement Bond Act of 1915.
Soil Conservation Districts—Public Resources Code Secs. 9060-9807	—		—		Yes	Order of board.	—	
Storm Drain Maintenance District of 1937—1937:265:566, D.A. 2208	—		—		—		—	
Storm Water Districts—1909:222:339, D.A. 6176	Yes	Two thirds.	—		—		—	
Water Conservation Districts of 1927—1927:91:160, D.A. 9127a	—		—		—		Yes	Warrants limited to formation expense and 25 cents per acre.
Water Conservation Districts of 1931—1931:1020:2045, D.A. 9127c	Yes	Two thirds.	—		Yes	Limited to reclaimed water revenue.	Yes	Bonds may be limited to zones improved.
Water Districts (California) Water Code Secs. 34000-38501	Yes	Two thirds.	—		Yes	Majority.	Yes	6% warrants for short-term loans upon four fifths vote of board.
Water Replenishment Districts—Water Code Sections 60000-60449	Yes	Two thirds.	—		—		—	
Water Storage Districts (California)—Water Code Secs. 39000-48401	Yes	Majority.	—		—		Yes	
Water Storage and Conservation Districts—1941:1253:3139, D.A. 9126a	Yes	Majority.	—		—		Yes	Warrants up to one half cost of U.S. co-operation.

* Repealed by Ch. 2165, Stats. 1957, except existing districts governed by such law until 1960.

B. WATER DISTRICTS (SPECIAL LAW)

BONDS

	General obligation		Revenue		Refunding		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
Alameda County Flood Control and Water Conservation District—1949:1275:2240, D.A. 205.	Yes (by zones)	Two thirds.	—	—	—	—	—	
American River Flood Control District—1927:808: 1596, D.A. 320.	Yes	Majority.	—	—	Yes	Resolution board trustees	—	
Avenal Community Services District—1955:1702:3126, D.A. 1525	Yes	Two thirds.	Yes	Majority.	Yes	Majority.	—	Short term notes, not to exceed amount equal to $1 for each acre
Benicia Reclamation District—1921:842: 1611.	Yes	Majority.	—	—	Yes	Majority.	Yes	
Brisbane County Water District—1950 (1st Ex. Sess.):13:447, D.A. 9124e.	Yes	Two thirds.	Yes	Majority or two thirds.	Yes	Majority.	Yes	
City of Marysville Levee District—1875-76: 134:131 (Amended by 1957:19)	Yes	Two thirds.	—	—	Yes (to refund indebtedness to city)	Two thirds.	—	May incur indebtedness to repay City of Marysville.
Contra Costa County Flood Control and Water Conservation District—1951:1617: 3638, D.A. 1661, renumbered 1656.	Yes (by zones)	Two thirds.	—	—	—	—	—	
Contra Costa County Storm Drainage District—1953:1532:3191, D.A. 1657	Yes (by zones)	Two thirds.	—	—	Yes	Resolution and consent of holders.	—	
Contra Costa County Water Agency—1957:518	Yes	Two thirds.	Yes	Majority	Yes	Majority.	Yes	
Del Norte County Flood Control District—1955:166:613, D.A. 2040	Yes (by zones)	Two thirds.	—	—	—	—	—	
Donner Summit Public Utility District—1950 (1st Ex. Sess.): 15:450, D.A. 6401	Yes	Two thirds.	Yes	Two thirds.	—	—	—	

BONDS—Continued

	General obligation		Refunding		Revenue		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
Resort Districts—Public Resources Code Secs. 10000-12164	Yes	Majority.	—		—		Yes	If district formed in certain manner may use Improvement Act of 1911 and Improvement Bond Act of 1915.
Soil Conservation Districts—Public Resources Code Secs. 9060-9807	—		—		Yes	Order of board.	—	
Storm Drain Maintenance District of 1937—1937:265:566, D.A. 2208	—		—		—		—	
Storm Water Districts—1909:222:339, D.A. 6176	Yes	Two thirds.	—		—		—	
Water Conservation Districts of 1927—1927:91:160, D.A. 9127a	—		—		—		Yes	Warrants limited to formation expense and 25 cents per acre.
Water Conservation Districts of 1931—1931:1020:2045, D.A. 9127c	Yes	Two thirds.	—		Yes	Limited to reclaimed water revenue.	Yes	Bonds may be limited to zones improved.
Water Districts (California) Water Code Secs. 34000-38501	Yes	Two thirds.	—		Yes	Majority.	Yes	6% warrants for short-term loans upon four fifths vote of board.
Water Replenishment Districts—Water Code Sections 60000-60449	Yes	Two thirds.	—		—		—	
Water Storage Districts (California)—Water Code Secs. 39000-48401	Yes	Majority.	—		—		Yes	
Water Storage and Conservation Districts—1941:1253:3139, D.A. 9126a	Yes	Majority.	—		—		Yes	Warrants up to one half cost of U.S. co-operation.

* Repealed by Ch. 2165, Stats. 1957, except existing districts governed by such law until 1960.

B. WATER DISTRICTS (SPECIAL LAW)

BONDS

	General obligation		Revenue		Refunding		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
Alameda County Flood Control and Water Conservation District—1949:1275:2240, D.A. 205.	Yes (by zones)	Two thirds.	—	—	—	—	—	
American River Flood Control District—1927:808; 1596, D.A. 320.	Yes	Majority.	—	—	Yes	Resolution board trustees	—	
Avenal Community Services District—1955:1702:3126, D.A. 1525	Yes	Two thirds.	Yes	Majority.	Yes	Majority.	—	Short term notes, not to exceed amount equal to $1 for each acre
Benicia Reclamation District—1921:842: 1611.	Yes	Majority.	—	—	Yes	Majority.	Yes	
Brisbane County Water District—1950 (1st Ex. Sess.):13:447, D.A. 9124e.	Yes	Two thirds.	Yes	Majority or two thirds.	Yes	Majority.	Yes	
City of Marysville Levee District—1875-76: 134:131 (Amended by 1957:19)	Yes	Two thirds.	—	—	Yes (to refund indebtedness to city)	Two thirds.	—	May incur indebtedness to repay City of Marysville.
Contra Costa County Flood Control and Water Conservation District—1951:1617: 3638, D.A. 1661, renumbered 1656.	Yes (by zones)	Two thirds.	—	—	—	—	—	
Contra Costa County Storm Drainage District—1953:1532:3191, D.A. 1657	Yes (by zones)	Two thirds.	—	—	Yes	Resolution and consent of holders.	—	
Contra Costa County Water Agency—1957:518	Yes	Two thirds.	Yes	Majority	Yes	Majority.	Yes	
Del Norte County Flood Control District—1955:166:613, D.A. 2040	Yes (by zones)	Two thirds.	—	—	—	—	—	
Donner Summit Public Utility District—1950 (1st Ex. Sess.): 15:450, D.A. 6401	Yes	Two thirds.	Yes	Two thirds.	—	—	—	

B. WATER DISTRICTS (SPECIAL LAW)

BONDS—Continued

	General obligation		Revenue		Refunding		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
Fresno Metropolitan Flood Control Act—1955:503:971, D.A. 2791	Yes	Majority.	—	—	—	—	—	District notes not to exceed 10 cent tax levy in amount.
Humboldt County Flood Control District—1945:939:1754, D.A. 3515.	Yes	Two thirds.	—	—	—	—	—	
Hunters Point Reclamation District—1955:1573:2855, D.A. 6532	Yes	Majority.	—	—	Yes	Majority.	Yes	
Kings River Conservation District—1951:931:2463, D.A. 4025	Yes	Two thirds.	Yes	Two thirds.	Yes	Majority.	—	
Knight's Landing Ridge Drainage District—1913:99:109.	Yes	Majority.	—	—	–	—	Yes	
Lake County Flood Control and Water Conservation District—1951:1544:3522, D.A. 4145	Yes (by zones)	Two thirds.	—	—	Yes	Resolution and consent of holders.	—	
Los Angeles County Flood Control District—1915:755:1502, D.A. 4463	Yes	Majority.	—	—	—	—	—	May borrow federal funds without elections up to $4,500,000.
Lower San Joaquin Levee District—1955:1075:2047, D.A. 4298		No	provision					
Marin County Flood Control and Water Conservation District—1953:666:1915, D.A. 4599	Yes (by zones)	Two thirds.	—	—	—	—	—	
Mendocino County Flood Control and Water Conservation District—1949:995:1810, D.A. 4830	Yes	Two thirds.	—	—	Yes	Board resolution.	Yes	
Montalvo Improvement District—1955:549:1016, D.A. 5239a	Yes	Majority.	Yes	Majority.	—	—	—	
Mono County Public Utilities District—1957:1413	Yes	Two thirds.	Yes	Two thirds.	Yes	Two thirds.		

Monterey County Flood Control and Water Conservation District—1947:699:1739, D.A. 5064	Yes (by zones)	Two thirds.	—	—	—	—	—	
Morrison Creek Flood Control District—1953:1771:3528, D.A. 6749	Yes	Two thirds.	—	—	Yes	Resolution and consent of holders.	Yes	
Napa County Flood Control and Water Conservation District—1951:1449:3411, D.A. 5275.	Yes (by zones)	Two thirds.	—	—	—	—	—	
Oliverhurst Public Utility District—1950 (1st Ex. Sess.):12:446, D.A. 6400	Yes	Two thirds.	Yes	Two thirds.	—	—	—	
Orange County Water District—1933:924:2400, D.A. 5683	—	—	—	—	—	—	Yes	
Orange County Flood Control District—1927:723:1325, D.A. 5682	Yes	Two thirds.	—	—	—	—	—	
Palo Verde Irrigation District—1923:452:1067.	Yes	Majority.	—	—	Yes	Majority	—	
Placer County Water Agency—1957:1234	Yes	Two thirds.	Yes	Order of board				Temporary or interim bonds authorized.
Reclamation District No. 10—1913:194:337	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 70—1905:552:717	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 317—1877-8:379:562	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 800—1907:213:259.	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 830—1911:171:342.	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 832—1911:402:808	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 833—1911:403:809	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 900—1911:100:264	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 999—1913:161:242	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 1000—1911:412:835	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 1001—1911:411:831	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 1500—1913:100:130	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 1600—1913:195:338	Yes	Majority.	—	—	Yes	Majority.	Yes	

B. WATER DISTRICTS (SPECIAL LAW)

BONDS—Continued

	General obligation		Revenue		Refunding		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
Reclamation District No. 1660—1915:591:1034	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 2020—1917:613:956	Yes	Majority.	—	—	Yes	Majority.	Yes	
Reclamation District No. 2031—1919:338:658	Yes	Majority.	—	—	Yes	Majority.	Yes	
Riverside County Flood Control and Water Conservation District—1945:1122:2131, D.A. 6642	Yes (by zones)	Two thirds.	—	—	—	—	—	
Sacramento County Water Agency—1952 (1st Ex. Sess.):10:315, D.A. 6730a	Yes	Two thirds four-fifths of board.	—	—	Yes	Majority or board resolution.	—	(See bonded indebtedness limits.)
Sacramento River West Side Levee District—1915:361:516, D.A. 4296	—	—	—	—	—	—	Yes	
San Benito County Water Conservation and Flood Control District—1953:1598:3279, D.A. 6808	Yes (by zones)	Two thirds.	—	—	—	—	—	
San Bernardino County Flood Control District—1939:73:1011, D.A. 6850	Yes (by zones)	Two thirds.	—	—	—	—	—	
San Diego County Flood Control District—1945:1372:2560, D.A. 6914	No	provision.						
San Joaquin County Flood Control and Water Conservation District—1956 (1st Ex. Sess.):46	Yes (Zone basis)	Two thirds			Yes	None (consent of bondholders)	—	
San Luis Obispo County Flood Control and Water Conservation District—1945:1294:2426, D.A. 7205	Yes (by zones)	Two thirds.	—	—	—	—	—	

Santa Barbara County Flood Control and Water Conservation District—1955:1057:2006, D.A. 7304	Yes (zone basis)	Two thirds.	—	—	Yes	None (consent of bondholders)	—	May borrow up to 85% of anticipated revenue.
Santa Barbara County Water Agency—1945:1501:2780, D.A. 7303	Yes	Two thirds four-fifths of board.	—	—	Yes	Majority or by board	—	(See bonded indebtedness limits.)
Santa Clara-Alameda-San Benito Water Authority—1955:1289:2349, D.A. 9102		No	provision					
Santa Clara County Flood Control and Water Conservation District—1951:1405:3336, D.A. 7335	Yes (by zones)	Two thirds	—	—	—	—	—	
Santa Cruz County Flood Control and Water Conservation District—1955:1489:2701, D.A. 7390	Yes (zone basis)	Two thirds	Yes	Majority.	Yes	None	—	
Shasta County Water Agency—1957:1512	—	—	—	—	—	—	Yes	
Solano County Flood Control and Water Conservation District—1951:1656:3748, D.A. 7733	Yes	Two thirds four-fifths of board	—	—	Yes	Majority or board resolution.	—	(See bonded indebtedness limits.)
Sonoma County Flood Control and Water Conservation District—1949:994:1793, D.A. 7757	Yes	Two thirds.	Yes	Majority.	Yes	Board resolution.	Yes	
Sutter County Levee District No. 1—1873-4:349:511	—	—	—	—	—	—	Yes	
Swampland District No. 150—1873-4:629:867	Yes	Majority.	—	—	Yes	Majority.	Yes	
Tehama County Flood Control and Water Conservation District—1957:1280	Yes	Two thirds	—	—	—	—	—	
Union Island Reclamation District Nos. 1 and 2—1903:36:37	Yes	Majority.	—	—	Yes	Majority.	Yes	
Vallejo Sanitation and Flood Control District—1952 (1st Ex. Sess.):17:351, D.A. 8934	Yes	Majority.	Yes	Majority.	—	—	Yes	
Ventura County Flood Control District—1944 (2d Ex. Sess.):44:168, D.A. 8955	Yes	Two thirds.	—	—	—	—	—	
Yolo County Flood Control and Water Conservation District—1951:1657:3772, D.A. 9307	Yes	Two thirds.	—	—	Yes	Board resolution.	Yes	

C. FIRE AND POLICE PROTECTION DISTRICTS

BONDS

	General obligation		Refunding		Revenue		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
County Fire Protection Districts—Health and Safety Code Secs. 14400-14598.5	Yes	Majority.	—	—	—	—	Yes	
Fire Protection District (in one or more counties) Health and Safety Code Secs. 14600 et seq.	—	—	—	—	—	—	Yes	Interest rate 75%
Fire Protection District in Unincorporated Area—Health and Safety Code Secs. 14100 et seq*	Yes	Majority.	—	—	—	—	—	
Joint County Jail Districts—Penal Code Sections 4050-4067			No	provision				
Local Fire Districts—Health and Safety Code Sections 14001-14285	Yes	Majority.	—	—	—	—	—	Not to exceed 10% of assessed value
Metropolitan Fire Protection Districts—Health and Safety Code Secs. 14325-14375	Yes	Majority.	—	—	—	—	—	
Police Protection Districts in Unincorporated Towns—Health and Safety Code Secs. 20000-20143			No	provision				
Police Protection Districts in Unincorporated Territory—Health and Safety Code Secs. 20300-20349	—	—	No	provision				

* Repealed by Ch. 1624, Stats. 1957. Districts may reorganize under new law, Sec. 14271, H. & S. C.

D. HARBOR DISTRICTS

BONDS

	General obligation		Refunding		Revenue		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
Harbor Districts—Harbors and Navigation Code Secs. 6000-6111	Yes	Two thirds.	Yes	Two thirds of governing board.	Yes	Two thirds of governing board.	—	Bonded indebtedness limited to 15% of assessed value.
Harbor Improvements Districts—Harbors and Navigation Code Secs. 5800-5915	Yes	Majority.	—	—	—	—	—	Additional bonds may be issued in same manner as original issue.
Joint Harbor Improvement Districts—Harbors and Navigation Code Secs. 5700-5784	Yes	Majority.	—	—	—	—	—	
Port Districts—Harbors and Navigation Code Secs. 6200-6372	Yes	Two thirds.	Yes	Two thirds of governing board	Yes	Two thirds of governing board	—	
Recreational Harbor Districts—Harbors and Navigation Code Secs. 6400-6694	Yes	Majority.	—	—	—	—	—	
River Port Districts—Harbors and Navigation Code Secs. 6800-6963	Yes	Two thirds.	Yes	Two thirds of governing board	Yes	Two thirds of governing board		

E. HEALTH AND SAFETY DISTRICTS

BONDS

	General obligation		Refunding		Revenue		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
Air Pollution Control Districts—Health and Safety Code Secs. 24198-24323		No	provision					
Bay Area Air Pollution Control District—Health and Safety Code Sections 24345-24372		No	provision					May incur indebtedness not to exceed anticipated revenue for next year.
County Sanitation Districts—Health and Safety Code Secs. 4700-4859	Yes	Two thirds, or if recommended by health officer, majority.	Yes	Majority.	Yes	Majority.	—	
County Sewerage and Water Districts—Health and Safety Code Secs. 5500-5656	Yes	Two thirds.	—	—	Yes	Two thirds.	—	Additional general obligation bonds for same project on ⅔ vote. Improvement Act of 1911, Street Opening Act of 1903, Improvement Bond Act of 1915.
Garbage Disposal Districts—Health and Safety Code Secs. 4100-4163		No	provision					
Garbage and Refuse Disposal Districts—Health and Safety Code Secs. 4170-4197	Yes	Two thirds.	Yes	Majority.	Yes	Majority.	—	Additional general obligations on ⅔ vote.
Joint Municipal Sewage Disposal Districts—Health and Safety Code Secs. 5700-5830.08	Yes	Two thirds.	Yes	Two thirds.	Yes	Majority.	—	General obligation bonded indebtedness may not exceed 15% of assessed value.
Local Health Districts—Health and Safety Code Secs. 880-972		No	provision					

Local Hospital Districts—Health and Safety Code Secs. 32000-32490.9	Yes	Two thirds.	—	—	—	—	—	Bonded indebtedness may not exceed 10% of assessed value short-term certificates of indebtedness.
Mosquito Abatement Districts—Health and Safety Code Secs. 2200-2398	No	specific provision		—	—	—	Yes	May borrow money in fiscal year to be repaid in next fiscal year not to exceed 15% of assessed value.
Municipal Sewer Districts—Act of 1911—Health and Safety Code Secs. 4600-4639	Yes	Two thirds.	—	—	—	—	—	Interest rate not over 6%.
Municipal Sewer Districts of 1939—1939: 24:37, D.A. 5192a	Yes	Two thirds	—	—	—	—	—	Bonded indebtedness may not exceed 25% of assessed value, and interest rate not over 6%.
Pest Abatement Districts—Health and Safety Code Secs. 2800-2922		No	specific provision		—	—	Yes, must repay in same fiscal year.	May borrow not to exceed anticipated revenues of fiscal year to be repaid in same year. Not over 6% interest.
Public Cemetery Districts—Health and Safety Code Secs. 8890-9225		No	provision					
Regional Sewage Disposal Districts—Health and Safety Code Sections 5900-6110	Yes	Two thirds vote of board and electorate.	—	—	Yes	Majority.	—	
Sanitary Districts—Act of 1923—Health and Safety Code Secs. 6400-6917	Yes	Two thirds or recommended by health officer, majority.	Yes	Majority.	—	—	—	Bonded indebtedness may not exceed 15% of assessed value, not over 6% interest.
Sewer Districts in Unincorporated Territory—Act of 1899—Health and Safety Code Secs. 4659-4667		No	provision					
Sewer Maintenance Districts—Health and Safety Code Secs. 4860-4926		No	provision					

F. STREETS AND HIGHWAYS DISTRICTS

BONDS

	General obligation		Refunding		Revenue		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
Boulevard Districts—Streets and Highways Code Secs. 26000-26263	Yes	Two thirds.	—	—	—	—	—	Interest rate may not exceed 6%.
Bridge and Highway Districts—Streets and Highways Code Secs. 27000-27325	Yes	Two thirds.	Yes	Two thirds.	Yes	Two thirds.	—	Interest rate may not exceed 6%, and bonded indebtedness may not exceed 15% of assessed value.
Highway Lighting Districts—Streets and Highways Code Secs. 19000-19312	—	No provision						
Joint County Road Camp Districts—Penal Code Secs. 4200-4227	—	No provision						
Joint Highway Districts—Streets and Highways Code Secs. 25000-25521	Yes (see revenue bonds)		—	—	Yes	(Election and two-thirds vote required only if protested by 5% of electors)	—	Funding bonds by board unless protested by owners of 25% of land. Emergency bonds issued by board.

Municipal Lighting Maintenance Districts—of 1927—Streets and Highways Code Secs. 18600-18781	—	No	provision					
Parking Authorities—Parking Law of 1949—Streets and Highways Code Secs. 32500-33552	—	—	Yes	Majority.	Yes	Majority.		
Parking Districts—Streets and Highways Code Secs. 35100-35705	Yes	(Subject to majority protest)	—	—	Yes	(Subject to majority protest)	—	
Separation of Grade Districts—Streets and Highways Code Secs. 8100-8282	Yes	Two thirds.	—	—	—	—	Yes	
Transit Districts—Public Utilities Code Secs. 24501-27509	Yes	Two thirds.	Yes	Two thirds of board.	—	—	—	Election called by two thirds vote of board or petition of 15% of voters. Bonds for public works limited to 20% of assessed value.
Vehicle Parking Districts—Streets and Highways Code Secs. 31500-31866	Yes	Order of legislative body.	—	—	—	—	—	Interest rate may not exceed 6% or 19 year term.

G. MISCELLANEOUS DISTRICTS (GENERAL LAW)

BONDS

	General obligation		Refunding		Revenue		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
Airport Districts—Public Utilities Code Secs. 22201-22979	Yes	Two thirds.	Yes	Two thirds.	—	—	—	
Citrous Pest Control Districts—1939:89: 1055, D.A. 130	—	No	provision	—	—	—	—	
Horticultural Protection Districts—1935: 756: 2123, D.A. 3418	—	No	provision	—	—	—	—	
Library Districts—Education Code Secs. 22601-22733	Yes	Two thirds.	Yes	Two thirds.	—	—	Yes	General obligation limited to 5% of assessed valuation.
Library Districts in Unincorporated Towns and Villages—Education Code Secs. 22301-22434	Yes	Two thirds.	Yes	Two thirds.	—	—	Yes	General obligation limited to 5% of assessed valuation.
Memorial Districts—Military and Veterans Code Secs. 1170-1250	Yes	Two thirds.	—	—	—	—	—	
Municipal Corporation Tunnel Authorities —1951:1347:3248, D.A. 8731	—	—	Yes	Two thirds of governing board.	Yes	Two thirds of governing board.	—	
Planning Districts—Government Code Secs. 66100-66390	—	—	—	—	—	—	—	Indebtedness not to exceed revenue for current or ensuing year.
Student Transportation Districts—Education Code Secs. 21621-21653	—	No	provision					
Union High School Library Districts—Education Code Secs. 22801-23102	Yes	Two thirds.	Yes	Two thirds.	—	—	—	General obligation limited to 5% of assessed valuation.

H. MISCELLANEOUS DISTRICTS (SPECIAL LAW)

BONDS

	General obligation		Refunding		Revenue		Interest-bearing warrants	Miscellaneous
	Authorized	Vote	Authorized	Vote	Authorized	Vote		
Fairfield-Suisun Sewer District—1951:303:553, D.A. 7551a	Yes	Majority.	—	—	Yes	Majority.	—	
Monterey Peninsula Airport District—1941:52:684, D.A. 153	Yes	On order of board of directors.	—	—	—	—	—	
Mount San Jacinto Winter Park Authority—1945:1040:2007, D.A. 6385	—	—	Yes	On order of governing body.	Yes	On order of governing body.	—	
San Francisco Bay Area Metropolitan Rapid Transit District—1949:1239:2173, D.A. 7102b Renumbered 7101c*	Yes	Three-fourths of council and two-thirds electors.	Yes	Two thirds.	Yes	Three-fourths of council.	—	
San Francisco Bay Area Rapid Transit District—Public Utilities Code Secs. 28500-29757	Yes	Majority of each board of supervisors and two-thirds voters.	Yes	Two thirds.	Yes	Majority.	—	General obligation limited to 15% of assessed value. May issue interim bonds.
Solvang Municipal Improvement District—1951:1635:3676, D.A. 5239	Yes	Majority.	—	—	Yes	Majority.	—	
World Trade Center Authorities—1947:1508:3106, D.A. 9300	—	—	Yes	On order of governing body.	Yes	On order of governing body.	—	

* Repealed except Secs. 37.5 and 39 by Ch. 1067, Stats. 1957.

II. SUMMARY ANALYSIS OF HEARINGS ON PUBLIC INDEBTEDNESS

Hearings were held by the Subcommittee on Public Indebtedness in Los Angeles on December 3, 1957, in Fresno on January 9, 1958, in Richmond on May 23, 1958, in San Diego on September 12, 1958, and in Los Angeles on December 30, 1958, with Assemblyman S. C. Masterson as chairman.

At each hearing, the chairman explained that the hearing was held pursuant to House Resolution No. 305 for the purpose of studying the subject matter of Assembly Constitutional Amendment No. 46. Every attempt was made to secure as witnesses at these hearings people who, because of their professional interest or official position, were qualified to make contributions of value.

It has seemed desirable in this report to include a resumé of some of the views expressed by witnesses who testified. The following discussion will, therefore, endeavor to make such a summary from the stenographic reports of the hearings.

SUMMARY ANALYSIS OF HEARING IN LOS ANGELES
December 3, 1957

Les A. Parker, representing the Los Angeles Building and Trades Council and the State Federation of Labor stated that Assembly Constitutional Amendment No. 46 was listed with the state federation as one of the bad bills. He also stated that due to the increase in population it has been impossible to keep up with financing of local facilities by elections and bond issues. He felt that in case of a disaster in Los Angeles it wouldn't make sense to have to wait for an election to provide funds to rebuild needed facilities. Mr. Parker said that the labor organizations felt our public boards had done an excellent job in protecting the public with definite savings of funds by using the present methods of financing.

Ray C. Eberhard, Attorney for the California Municipal Utilities Association testified that the association is opposed to Assembly Constitutional Amendment No. 46 in its present form. He felt that the present Constitution covered the situation adequately. The present Constitution requires a two-thirds vote before a county, city, or school district can incur an indebtedness exceeding the revenue and income provided in any one year. Assembly Constitutional Amendment No. 46 would grant a 10 percent reduction in that requirement. "I say a good argument might be made for that change, I won't, I'm not attempting to say what the association would think about that because that is not the only thing proposed here. Possibly a 60 percent vote would be sufficient. A 50 percent vote is sufficient for State bonds, it might be that 60 percent would be sufficient for the others, although I'm not empowered to speak on that."

The association has interpreted a portion of Assembly Constitutional Amendment No. 46 (lines 1 to 10, page 2) to mean that all indebtedness secured by general obligation bonds must be paid from ad valorem taxes and not from revenues received from the project financed. The association feels that the present system of permitting the local officials responsible to the people of the particular areas involved to determine, as they have in the past, how the costs of these municipal enterprises should be borne is sound and should be continued.

Assembly Constitutional Amendment No. 46 is further objectionable in its provisions relative to the issuance of revenue bonds. Larger cities which have charter provisions on the subject, are exempt from the proposal, but it does affect revenue bonds of some districts which now have authority to issue such bonds by action of their governing boards.

The association also objects to the lease-purchase feature of the amendment. According to the amendment, a city or county, or school district may enter into a lease for 50 years without an option to purchase or a lease for exactly 10 years with an option to purchase and still no public vote would be required, but a 15-year lease with an option would be illegal.

M. Tellefson, City Attorney for the City of Culver City, stated that in respect to the reduction from two-thirds to a 60 percent vote, it could just as well be reduced to a majority vote. "Why should a higher vote requirement be necessary for local agencies where altogether there is a much higher percentage of voters who are property owners than in the State as a whole, in which general obligation bonds are approved by a majority vote?

"The lease-purchase arrangement utilized by the Federal Government and private enterprise, is a most important vehicle which should be available to all public agencies for the acquisition of necessary public improvements, the cost of which is too large to finance from current revenues, or which for one reason or another cannot be secured through general bond issues."

Attention should be given to legislation which would permit the cancellation of taxes on the facilities acquired under such agreements and dedicated to public use. The tax load which attaches itself to the property until title is actually acquired by the city is responsible for a very substantial part of the higher cost of this method of financing, Mr. Tellefson stated.

Melvin Horton, representing the Property Owners Tax Association of California said his association feels that reducing the present two-thirds vote to 60 percent to make still easier the passage of general obligation bond propositions would not be in the public interest. Abuses of the power to incur public indebtedness could take place under present law. However, submitting lease-purchase agreements to a vote of the electorate might result in public agencies resorting to straight leasing of buildings without the possible advantage of later taking title to the building by an option to purchase at a fixed price.

Alan M. Firestone, Chief Deputy City Attorney for the City of San Diego stated that the City of San Diego is concerned primarily with that portion which deals with the requirement that general obligation bonds must be paid from ad valorem taxes. This would deprive the people of San Diego of the right to take advantage of better interest

rates in the sale of bonds. General obligation bonds can be sold at better interest rates than can revenue bonds. If a utility is built, it would be necessary to pay for it from ad valorem taxes and the revenues from the utility could not be used to pay for the general obligation bonds. This is not the only portion of the bill the City objects to, but it is the one which affects us most importantly.

Frank M. Wright, Associate Superintendent of Public Instruction for the State Department of Education. The chairman read into the record a statement from Mr. Wright who stated, "It is the feeling of the State Department of Education that the school districts would welcome the proposed liberalization to authorize bonded indebtedness and would agree with the definition of debt as now contained in the proposals."

H. G. Rainwater, Chairman of the Visalia Taxpayers' Association. The chairman read into the record the following statement: "The Visalia Taxpayers' Association feels that reducing the two-thirds vote requirement safeguard would be a dangerous precedent."

Richard Winter, California Taxpayers' Association. The association is opposed to any reduction in the present vote requirement. A two-thirds vote should be required before local governments may enter into lease-purchase arrangements. Property owners should be protected against any easy voting of public debt guaranteed by the property of the people. Present methods of revenue bond financing does not give the people an opportunity to express themselves directly on the creation of the liability for which they are responsible, Mr. Winter stated. He further stated that the Executive Committee of the California Taxpayers' Association opposes Assembly Constitutional Amendment No. 46 because it violates what they consider to be sound financial policy.

Edward D. Landels, Investment Bankers of America, California Group, stated that he felt the general objectives in Assembly Constitutional Amendment No. 46 are desirable, however, some further work should be done on the language of the amendment itself.

The amendment does two things: first, it would make the voting requirement applicable to the incurring of any long-term debt which constitutes a general obligation of the taxpayer; and second, it would reduce the requirement now applicable only to cities, counties, and school districts from two-thirds to 60 percent.

It is not the intention of the amendment to require that all general obligation bonds be paid exclusively from ad valorem taxes. That results, if it results at all, from clumsy drafting of the amendment. This disposes of all the objections of the City Attorney from San Diego and to a large extent it disposes of the objections raised by Mr. Eberhard. Some consideration should be given to liberalizing the provisions as applied to revenue bonds. The amendment needs more work, but the Investment Bankers Association is in favor of the two or three main purposes of the amendment. Those who defend the two-thirds vote requirement cannot justify eliminating from that requirement all types of special districts.

Lease-purchase obligations are not tax exempt and of necessity they carry anywhere from one to two percent higher interest rates. By requiring a two-thirds vote to incur a cheap debt, and no vote of the

people at all to incur the most expensive kind of public debt, which is generally speaking lease-purchase, the credit of the State of California is being endangered.

There are in California today, approximately two billion dollars worth of state and municipal bonds authorized and unsold. The difference of a fraction-of-a-percent on those bonds which will be sold in the next year or two can put a tremendous load on the taxpayers of California. It is time to revise the amendment to bring it up to date. The same provision should be applicable to all special types of districts which in many cases are less responsible to the electorate or the taxpayer than cities or counties or school districts. A reduction in the voting requirement would encourage cities and counties to vote general obligation bonds which is the cheapest way of financing.

The Investment Bankers don't believe the reduction would result in any great increase or great flood of municipal bonds. The State's credit cannot remain high if this higher-cost type of financing is continued.

Franklin Stockbridge, Vice President of the Security-First National Bank of Los Angeles, appearing as Chairman of the Municipal Securities Committee of the California Group of the Invesment Bankers Association stated that the State of California and its districts are financed through bonds to the extent that each year the bonds issued amount to more than 10 percent of the total amount of the bonds issued in the country as a whole. It is necessary to attract Eastern capital to provide the bonds to build schools, water projects, etc. Out-of-state investors are becoming increasingly concerned with the lax way in which California is incurring debt. Lease-purchase type of financing is very disturbing to Eastern investors. If investors decide that safeguards are being removed (taxpayers are no longer in control of the amount of debt they incur) they can look for some other place to invest their capital. They do not have to buy California bonds.

Assembly Concurrent Amendment No. 46 is basically sound. It accomplishes two things: it puts all districts on the same borrowing basis and; it closes the loopholes that allow districts to go around the financing safeguards.

Don Davis, general partner in the firm of Stone and Youngberg, Investment Securities and also a member of the Municipal Securities Committee of the Investment Bankers Association said the two-thirds vote was enacted by the Legislature when there was a great deal of nonresident ownership of property in the State and the voting power of the people was not necesarily in relationship to the taxpaying liability. The two-thirds majority vote provision, as it now stands, simply means that slightly more than one voter may defeat the wishes of two voters which is not in accordance with democratic principles.

The State of California's credit as such is being reduced and with the huge volume of financing that we are confronted with, it may be reduced more.

Harry C. Williams, City Attorney of the Cities of West Covina and Azusa said that he felt it is only proper that this debt limitation should apply to all those local governing boards which have the power to incur indebtedness or issue bonds. "I think there should be a general attitude in favor of the reduction of the percentage of vote required to 60 percent. The concept that one voter out of three can defeat the

desire and wishes and vote of the other two is a little severe. On the other hand, it seems to me that cities would not favor any too relaxed provisions permitting the incurring of indebtedness, and therefore, it seems that this 60 percent provision would be an acceptable compromise between the present rather severe provision and the simple majority provision."

As to the lease-purchase provision—in a lease, the lease is not generally considered legally to be a debt. If it is to be considered a debt, it is the obligation to pay rent that is the debt, not the option to purchase which is not binding at all except as a right which may be or may not be exercised.

F. W. Converse, Member of the State and Local Government Committee of the Los Angeles Chamber of Commerce, said the Chamber of Commerce has a clear policy of opposition to changing the percent from a two-thirds vote to a majority vote, but has not reached a conclusion on a vote by 60 percent of the electors.

The Chamber is further of the opinion that the Constitution should be amended to include lease-purchase financing of public improvements within the definition of indebtedness or liability subject to a vote of the electorate. Such financing devices represent a dangerous loosening of fiscal practice, taking away from the people the right to decide what long-term obligations they wish to have undertaken.

Paul Burke, Chairman, Los Angeles City Board of Education Committee on Law and Rules. Mr. Burke stated that the Los Angeles School System encompasses one-fifth of the entire State. Their capital expenditures are all financed by bonds. "I strongly feel that the requirement of public approval should be applied to other schemes of financing expensive capital projects of local governments and that the subjection of all such financing to a public debt limitation should be brought about and I think this is one of the main objectives of Assembly Constitutional Amendment No. 46."

The Los Angeles Board of Education is concerned because we are planning an absolutely indispensable bond issue and a large one. In June of 1958 the prospect of obtaining a two-thirds majority bond vote for a school bond issue with the current taxpayer revolt still in progress is almost minimum.

The 58 counties in this State should be subjected to a reasonable debt ceiling and any increase in the debt ceiling should be submitted to the people for a majority vote of approval as is now the case with cities, chartered cities, and all school districts in the State.

Victor N. Hochee, representing the Los Angeles County Employees Association said his association has reviewed Assembly Constitutional Amendment No. 46 and desires to record its disapproval of this proposal. It would impose unnecessary restrictions upon the prosecution of needed and long overdue capital projects. It would be a grave mistake to surrender the present use of the flexible lease-purchase method of financing.

Robert McKay, Assistant Executive Secretary of the California Teachers' Association. The association is not in a position to voice support or disapproval of the measure as a whole, but has a subcommittee of their Statewide Committee on Financing Public Education

studying the matter very carefully. When this committee (Public Indebtedness) meets again, the association will be in a position to state what their attitude is on it.

Past attitudes of the California Teachers' Association on related matters would indicate that the association believes there should be a uniform procedure and requirement applicable to all such transactions.

Clara McDonald, representing the United Patriotic People of the U. S. A. said, "We're not in a position to say at this time whether there should be a deviation from the State ruling on school bonds or whatever other bonds over and above what is produced locally. When you are paying the principal and interest as well, on these bonds we should, I think, adopt the idea to go just a little bit slower on bonds and certainly in my mind, offhand, there should be no deviation from the two-thirds vote."

SUMMARY ANALYSIS OF HEARING IN FRESNO
January 9, 1958

Alan M. Firestone, Chief Deputy City Attorney for the City of San Diego expressed concern over that portion of Assembly Constitutional Amendment No. 46 which he felt necessitated levying ad valorem taxes to pay for any additions to the City of San Diego's public facilities. He admitted that he did not feel it was the intention of anyone in California to make this ad valorem tax phase a requirement and after discussion agreed to submit to the committee proposed changes in language to take care of his objections and to clarify the meaning of the section.

Mr. Firestone also stated that any reduction from the two-thirds vote requirement would aid in some measure to make more feasible the issuance of general obligation bonds. "If this portion of the bill were altered to reduce it to even 60 percent, although I would urgently suggest that 50 percent or a maqority, should be sufficient, that such reduction certainly would aid in some measure."

Asked if the City of San Diego had resorted to lease-purchase to any appreciable extent, he answered that the City of San Diego had never done so because it has been the position of his office that this is not the best way to finance public projects; that general obligation bond financing saves at least one percent per annum on the interest rate.

Clara McDonald, President of the United Patriotic People of the U. S. A., appeared as a representative of the South Bunker Hill Association and expressed their opposition to Assembly Constitutional Amendment No. 46 because it gave them no tax relief.

Mrs. McDonald recommended that there be no ballot submitted to non-property owners on bond-issue proposals; the two-thirds majority vote by the people remain; a ceiling be placed on budget commitments for the 58 counties; and that bills such as Senate Bill No. 1234, concerning condemnation proceedings, be repealed.

R. B. James, San Diego County Clerk, submitted a letter from the Board of Supervisors of San Diego County that expressed their opposition to Assembly Constitutional Amendment No. 46.

Philip Gregory, representing the Investment Bankers Association, California Group, called attention to a study he had made of the voting requirements of California's myriad of districts which showed a com-

pletely inconsistent hodgepodge of voting requirements. This study would indicate the desirability, if not pressing need, for some uniformity in this particular field.

There is general agreement in investment banking circles that the constitutional two-thirds vote requirement and the similar requirement in most district statutes has, perhaps as much as any other factor, been responsible for the generally high credit rating of California municipals and their general acceptance in the bond markets of the country.

It is believed by the Investment Bankers Association, California Group, that the adoption of a constitutional amendment along the lines of Assembly Constitutional Amendment No. 46 would, in the long run, strengthen the market for California municipal bonds and help insure a continuation of the generally high credit rating they have heretofore enjoyed. The salient effect of this proposed amendment is to allow the voters to have a chance to pass upon the incurrence of a long-term debt. Its adoption should over the years save the taxpayers millions of dollars by making it as easy for public agencies to finance needed public improvements by orthodox low-cost tax-free methods of financing as by resorting to other more costly methods.

To a question by Assemblyman Pattee: "If a bill like this went through which would stop a lot of the lease-purchase agreements and we went into a mandatory, or sold somewhat mandatory obligation bonds, this would help the banking industry quite a bit too wouldn't it?" Mr. Gregory replied: "Well, it would and wouldn't. Of course I think it's fair to say that a good deal of the funds used in a lease-purchase operation often would be borrowed from a bank so that wouldn't have any effect. But actually I'd like to make this point, Mr. Pattee, there's nothing in this proposed amendment that prohibits lease-purchase. All it does is say you have to submit it to the people."

Robert E. Hanley, Legislative Representative for the California Farm Bureau Federation, appeared to introduce Mr. Allan Grant to the committee. Mr. Hanley's introductory remarks related to Mr. Grant's background which he (Mr. Hanley) felt, put him in a position to reflect to the committee the thinking of farm and rural people on these questions.

Allan Grant, Member of the Board of Directors of the California Farm Bureau Federation, said he felt the majority of farmers in California would be opposed to a reduction of the two-thirds vote requirement.

> "It is of paramount importance that our government bonds be most acceptable to the investing public. Anything short of gilt-edge securities offered by us on the market will mean increased costs.
>
> "Thus in order to keep our credit costs at a minimum and also to insure ourselves against extravagance, I would urge retention of the two-thirds vote, at least until the establishment of some other equivalent safeguard has been developed by thorough study.
>
> "I question the advisability of incurring longtime public obligations without expressed public approval, it jeopardizes our credit and it takes government away from the people.

"I conclude with a reply to those who seek 'easy credit' and think of it in terms of avoiding the two-thirds vote. Easy credit is short-lived unless it is cheap credit and cheap credit is based upon confidence and capacity. The investors must be confident that the dividends can and will be paid. The best assurance of that is an adequate vote of the people."

Robert E. Hanley expressed appreciation of the opportunity of appearing before the committee; stated that the California Farm Bureau Federation felt the subject under study by the committee was very important and that his organization will have it under a thorough study, and would appreciate an opportunity of appearing before the committee at a future hearing.

SUMMARY ANALYSIS OF STATEMENTS SUBMITTED AT HEARING IN FRESNO

January 9, 1958

Robert McKay, Assistant Executive Secretary of the California Teachers' Association stated that after a careful analysis of the potential effect of the proposed constitutional amendment, not only upon school districts, but also upon other governmental agencies, the Finance Subcommittee of his association unanimously recommended approval of Assembly Constitutional Amendment No. 46. This recommendation was concurred in by the Committee on Financing Public Education.

The findings and recommendations of the Finance Committee were next submitted to the statewide Legislative Committee. After consideration the Legislative Committee took favorable action and recommended that the State Council of Education support Assembly Constitutional Amendment No. 46.

The recommendations of the Finance and Legislative Committees were submitted to the State Council at its Los Angeles meeting on December 7. The council took the recommendations under advisement and scheduled final action at its next meeting to be held in April.

Les A. Parker, representing the Los Angeles Building and Construction Trades Council said that Assembly Constitutional Amendment No. 46 will set up constitutional standards relating to the borrowing of money for capital improvements which will be more restrictive than those presently existing. The Los Angeles Building and Construction Trades Council is opposed to any constitutional provision which will interfere with any of the devices now used to authorize funds for capital improvements.

Harry D. Ross, Controller of the City and County of San Francisco, urged that constitutional debt restrictions not be bypassed. "I can but warn you that this is not one of the simple matters often requiring legislative or electoral action. It is not a black or white situation. There are many ramifications that must be studied. It is a task for committees aided by attorneys and the heads of governmental units dealing with this problem.

"It is my view that government must be responsive to the will of the people. Expenditures require taxes. Expenditures require income. I am of the opinion that debts and liabilities incurred beyond revenues

and incomes of fiscal years should be determined by the electorate and not by elected or appointed officers but, to reach this result, I am convinced we need a redrafting of our basic law."

SUMMARY ANALYSIS OF HEARING IN RICHMOND

May 23, 1958

Robert T. Andersen, Administrative Officer of Riverside County, submitted a letter to be read into the record.

The letter stated that Riverside County is very much in favor of reducing the requirement for the passage of a general obligation bond issue from the present 66⅔ percent to 60 percent as proposed by Assembly Constitutional Amendment No. 46. The present requirement for the passing of general obligation bond issues has forced a higher tax rate on the people of California in their county government.

Desmond M. Teeter, County Administrator, Contra Costa County. Mr. Teeter stated the requirement of a two-thirds vote for bond approval applies to some districts, e.g. cities, counties, schools, but a simple majority is sufficient for others, e.g. county fire districts, rural fire districts. One of each kind of such districts have issued bonds in Contra Costa at effective interest rates comparable with those obtained by school districts in the same general area at about the same time. Thus it appears that the requirement of a two-thirds vote is not of any great import to the bond buyer.

Communication is much better and more general today than when the constitutional restriction (of Article XI, Section 18) was adopted in 1879 with full information available to all voters the two-thirds vote requirement should be reduced. However, along with this, certain additional restrictions should be required in other aspects of borrowing. Specifically, the life of the bond issue should not exceed the useful life of the project for which the bonds are issued. Also there should be restrictions on the amount of debt in relation to the wealth of the jurisdiction doing the borrowing and taking into consideration the problem of overlapping debt as a result of overlapping districts.

Because of the difficulty of passing bond issues and also because of the expense of holding an election, it is often advisable to lease building space, particularly when only a small amount of space is needed. If in addition an option can be obtained to purchase at the end of the lease the saving in administrative expense often offsets the additional cost over bond financing. This means of financing should remain available to county management.

Lease-purchase financing is usually more expensive because of higher interest charges. Reducing the vote requirement from two-thirds to three-fifths would encourage cities and counties to make use of the less expensive interest charges of general obligation bond financing. Also, government is often put to additional administrative expense when as a result of failure to obtain a favorable two-thirds vote on a bond issue, it is forced to lease private property at a high rent and trying to adapt it to use in order to keep operating.

Richard Graves of Lafayette, California, said that cities, counties, and school districts have resorted to lease-purchase financing arrangements only because the present constitutional limitations (two-thirds vote requirement) have made it necessary in order to get some things done at all.

The elected representatives are given broad powers to act—it is only in the field of incurring an obligation to acquire capital facilities that we require a vote of the people. There is no valid reason for this distinction between the exercise of power in this field and the other fields of governmental action. The legislative body should have the power to implement its own orderly plan of capital improvements; if the people are dissatisfied they have the power of election, of recall and of referendum. Also it should be pointed out that the constitutional restriction was imposed when our society was largely agricultural and when most of our taxes were derived from property. Now that has changed—some cities in our State get 75 percent of their revenue from non-property sources—bond issues can be funded without levying a dollar of property tax.

Removal of the requirement of a vote of the people before incurring indebtedness would not affect the interest rate at all. The financial condition of the jurisdiction issuing the bonds and whether the bonds are an enforceable obligation against the taxable property of the district are the primary considerations of the bond buyer. A 90 percent favorable vote in a jurisdiction in bad financial condition would not result in a good interest rate. The interest rate is a reflection of the risk to the lender; if there is no more risk the rate will be the same.

We should recognize that the obligation to conduct local government is in the board of supervisors and city council and should undertake to implement some of their powers wisely, and with proper safeguards, rather than to proceed upon the assumption that they are incompetent to spend funds for capital outlay, although they are competent to levy taxes and spend funds for every other purpose.

Alan M. Firestone, Chief Deputy City Attorney, City of San Diego, stated:

> "I am not only representing the City of San Diego but also the California Municipal Utility Association. I am here today only to reaffirm the position which I have advanced before this. First, and I believe it has been accepted by your committee, was that position which would encourage the removal of the restriction of the use of revenues from a particular fund to pay off general obligation bonds. This was the main objection which the city had to the bill in its prior form and reading the amendment of January 24, 1957, I believe that objection has been removed.
>
> "We would also like to encourage the committee to reduce the voting to 60 percent in fact the position of the city would be to further reduce it to 50 percent.
>
> "I commented in my last appearance concerning some rather ill-fated experiences which happened in San Diego County. One of which was the county courthouse facility. On at least three occasions over the past eight to ten years general obligation bonds in the county were defeated by a fairly narrow margin. The facility was so bad and such a disgrace that the bond issue was an absolute

necessity. Finally it passed last year. The facility is now under way at a very substantial increase in cost over what it would have been some ten years ago. The same thing had occurred in connection with general obligation bonds in the city which was defeated, as I previously commented, by a very slight percentage some two percent under the two-thirds vote requirement, the cost of that facility now has almost doubled over what it could have been put in for some four years ago."

Richard Carpenter, Executive Director, League of California Cities, said the Constitution of 1879 permits the State to incur an indebtedness by a majority vote but requires a two-thirds vote of cities, counties, and school districts. No reason is apparent why the people can bind themselves to pay a state obligation by a majority vote but the same people can incur a local obligation only by two-thirds approving.

The League of California Cities is not in favor of any constitutional amendment which will make it more difficult for cities to finance capital improvements. It appears to us that instead of placing limitations on completely valid but alternative methods of financing public works (some of which are admittedly more expensive than general obligation bonds) it is more desirable to facilitate the use of the least expensive method of financing (i.e. general obligation bonds) by reducing the vote from the present two-thirds requirement to a simple majority as in the case of state bonds.

The development since 1879 of good budgeting, accounting, auditing and reporting suggests we should review the basic question of the amount of authority we could properly give now to our state and local legislative bodies to incur indebtedness.

Most representatives of city governments will be opposed to limitations on their powers either to lease or to purchase under so-called "lease-purchase" contracts. Likewise they will be opposed to limitations on their authority to issue revenue bonds. The present mandatory limitations in the Constitution were designed to prevent property tax indebtedness and not forms of indebtedness payable from other sources of taxes or property revenue. Therefore, the "special-fund" doctrine recognized in California and almost all of the other states should in no event be restricted by a revision of Section 18 of Article XI. Obligations payable solely from a special fund and not requiring a tax levy are in no sense an indebtedness within the meaning of Section 18, Article XI.

It is the view of the League of California Cities that Section 18 of Article XI might be amended to include all public agencies. It is also the league view that the two-thirds vote requirement should be made to conform to the majority vote requirement applying to the State itself. We would like to recommend a constitutional amendment which would extend the credit of the State, to local government at low rates of interest in order to enable them to undertake essential projects which do not lend themselves to revenue bond or special-fund types of financing. With these changes no others would be necessary because the availability of general obligation bonds would make the more expensive methods of financing unattractive and, as a practical matter, unacceptable to local legislative bodies.

Joseph Genser, Attorney for the California State Federation of Teachers said they favored reducing the vote required to pass school bonds. We also feel that the statutory provisions which limit school tax rates should be eliminated. These successive elections that are required are expensive, and the school board should be able to decide whether we need a new school building without having to put the matter to a vote at all; however, reducing the percentage required to approve the expenditures would be an improvement.

A. O. Lefors, Director, State Activities, of the California Taxpayers' Association believes that property owners should be protected against any easy voting of public debt guaranteed by the property of the people.

We are opposed to any relaxation of the present requirement of a two-thirds vote to approve general obligation bonds. We urge that this requirement be extended to all special districts as well and that "lease-purchase" contracts be included within the limitations. To liberalize the present two-thirds vote requirement would add to the already heavy tax burden, and would undoubtedly result in more bonds being voted as a lien on property and result in higher taxes being paid by all.

Les A. Parker, Business Representative for the Los Angeles Building and Construction Trades Council said:

> "We are interested, of course, in the material that we have received relative to other testimonies and we are still of the opinion that this should not be a constitutional amendment. If there are corrections needed, it possibly should be done by the Legislature itself, if it can be done. We are still convinced that we have a problem, particularly in Los Angeles County relative to financing capital improvements that has not been solved by elections."

Walter H. Vaughan, Finance Director of the City of Santa Rosa, California, said he would like to suggest that there be some differentiation in the types of bond issues; for example between such things as streets and sewers which lack the glamour for public appeal and yet may be more badly needed than for example a new library building.

> "Any municipality that is properly managed; has a good fiscal policy; employs competent legal advice and is in sound financial condition will get a favorable interest rate on its bonds. 'Lease-purchase' financing is more expensive. I think it should be covered in some manner either to allow them (lease-purchase contracts) to be tax exempt or to be taken off the tax roll. Liberalizing the manner in which we might secure a general obligation bond issue would make it unnecessary to resort to 'lease-purchase.'
>
> "Nor do we retire bonds entirely with direct property taxes. Last year in Santa Rosa only 27 percent of the city's revenue came from the ad valorem tax and of that, 10 percent represented the amount paid by the public utility roll. You're talking about the big absentee owners versus the home owner that's paying the bill, they are no more than paying their own share because if the people weren't there the utility wouldn't be interested

in being there either. I think that some schedule fixing the ratio of the vote required based upon whether the project is essential to the health and welfare of the community might be considered rather than a flat percentage applying to all issues.

"I also believe that some limitations should be put on the length of bonds—generally a forty year bond is too long—it results in an accessive accumulation of interest charges."

The following was to be read into the record but did not reach the committee until after the meeting had been held.

Thomas M. Montgomery, County Counsel, Humboldt County, Eureka, California. The Board of Supervisors of Humboldt County asked me to write you and express the following views.

"First, it is felt that Article XI, Section 18, of the Constitution should apply equally to all local government agencies.

"Second, it is felt that revenue bonds should be treated no differently from general obligation bonds.

"Third, it is felt that the present two-thirds vote requirement should remain in effect.

"Fourth, it is felt that the lease-purchase question poses the most difficult problem in connection with long-term public indebtedness. It is our feeling that there should be some limitations on the aggregate amount of lease-purchase contracts which may be outstanding, and that such contracts should not be used to circumvent bonding limitations. As far as counties are concerned, this point is covered by Section 25371 of the Government Code, which provides that 60 percent of the total payments which would become due under such leases, plus the total amount of outstanding bonded indebtedness, shall not exceed the maximum bonded indebtedness of the county."

SUMMARY ANALYSIS OF HEARING IN SAN DIEGO

September 12, 1959

Vince Cooper, County Supervisor Association, submitted a statement to be read into the record to the effect that the Supervisors Association advocated the retention of the present vote requirement.

Robert T. Andersen: It would seem reasonable for public agencies and investment bankers to be able to get together on some basis of a constitutional amendment which would allow a lesser percentage vote of the electorate for those counties, cities and school districts where their outstanding bonded indebtedness represents a very low percentage of the total assessed valuation.

"I recommend a constitutional amendment be submitted to the people which would allow general obligation bonds to be voted by the people on a sliding scale basis. For example, if a county or city bonded indebtedness represented less than two percent of their assessed valuation, it would require only a 55 percent vote. From two to three percent, 57 percent vote; three to four, 60 percent; four to five, 63 percent; and over five percent the present 66⅔ per-

cent vote. I also would like to present the possibility of using the Community Services District Act and taking advantage of the five-year installment loan. Public buildings could be financed by including one-fifth of the cost of the building in the yearly budget. The money to be raised by a property tax. Personally I feel that if the percentage were reduced to 60 percent, all of these various methods of financing other than revenue bond financing could be put to a vote of the people."

Alan Firestone: Mr. Firestone, Chief Deputy City Attorney for the City of San Diego, stated that his position had not changed and that the position of the California Municipal Utilities Association for whom he was likewise appearing at the request of the President, Mr. Paul Beermann, had not changed in the interim.

Franklin Stockbridge, Chairman of the Municipal Securities Committee, California Group, Investment Bankers Association of America, stated that his group was interested in the subject matter because the growth of California's population has been so great of late that the cities and counties have had to issue more bonds for public improvements than any other state and its subdivisions. Only about 15 percent of total state and municipal financing in the country comes from this State. Most of it must of necessity come from outside the State. That means that California bonds must be attractive to out-of-state buyers. They do not have to buy unless they are sure of a good return on their money and that the bonds offered are sound.

The Investment Bankers Association feels that adoption of a constitutional amendment with the intent of Assembly Constitutional Amendment No. 46 is generally in the broad public interest. There is no easy remedy of the problem of ill-considered financial schemes such as Proposition 17, but adoption of Assembly Constitutional Amendment 46 would indicate an awareness of the need of sound financing laws for local districts and would have a markedly positive effect on out-of-state investors. We feel that something more than a simple majority is a strengthening factor, but particularly important in our opinion is that all public agencies are covered by the same voting laws and that all long-term financing be so covered.

We would greatly prefer a minor relaxation of the voting requirement to insure the bond borrowing path be open to all needed public financing, because we feel that the financing methods that avoid the normal borrowing channels serve to weaken the credit regard in which the borrower, and to a lesser extent all borrowers in California, is held.

The principal reason that we are interested in referring a bond issue to the people is because by doing that, the public officials who are advocating the bond issue have got to justify it to somebody—and I'm not talking about the big jurisdictions now that are normally under pretty close scrutiny by the newspapers, taxpayers' association and everything else, but particularly in the smaller community it serve as a protection to them against promotional types of financing which is the sort of thing that gets everybody in trouble. I think that's a very important part of the interest in retaining a popular vote.

D. R. Grable, Chairman, Legislative Committee, California Real Estate Association, stated that the California Real Estate Association had not taken any action on Assembly Constitutional Amendment No. 46, but that he would take it up with them and have a full report at the next hearing. Speaking as an individual, he did not think the requirement for the people to vote on bond issues should be done away with.

SUMMARY ANALYSIS OF HEARING IN LOS ANGELES
December 30, 1958

N. L. Byram, Treasurer and Tax Collector for the County of Los Angeles, was asked to what extent they have borrowed under a lease-purchase arrangement from the Retirement Fund of the County. After making a short statement from the law that permits this procedure, he replied that if a contemplated jail (cost of which would be $21,000,000 and would add 10 cents on the current tax levy) was built, the total investment would be about $60,000,000. As of December 31, 1957, the outstanding general obligation bonded indebtedness of Los Angeles County was $21,000,000. There are some bonds that have been voted but not sold and these would make the two about equal. Mr. Byram gave an itemized account of what $60,000,000 had been and would be spent on.

Joseph M. Lowrey, Auditor-Controller of Los Angeles County, had prepared some statistical schedules in order to answer questions as to the bonded indebtedness of the County of Los Angeles. Mr. Lowery then proceeded to read into the record the names of the buildings the county is leasing, the length of the lease period, the monthly rental and the purchase price at the end of 20 years if the county decided to use its option to purchase. Mr. Lowery testified that none of these lease with option purchases had ever been submitted to a vote of the people.

James O. Stevenson, Director of the Los Angeles Bureau of Municipal Research and Secretary to the United Taxpayers stated that the voters of the county can encumber property in Los Angeles to 60 percent of the assessed valuation. In addition special assessments may be levied for the State and other public improvements up to 50 percent of the assessed valuation of the land. It also may be encumbered by the State school buildings and for various county contracted lease-purchase obligations. Property of Los Angeles County subject to these encumbrances is currently assessed as follows: Land, $2,931,919,000; Improvements, $4,920,085,000; Personal Property, $2,647,730,000; Total $10,500,536,000. Included in this tax base are improvements assessed for $4,920,985,890. No depreciation of these improvements has been allowed by the county assessor's office since 1940. Revaluations in 1946, 1947 and 1950 inspired by the State Board of Equalization have been accompanied by substantial increases of land assessments and a rise of the average tax rate of $4.94 a hundred in 1945 to $7.22 in 1958.

That taxation is outdistancing ability to pay is well illustrated by comparison of annual property tax collections of Los Angeles County with 4 percent of taxable retail sales. From 1945 the ratio of retail sales to property taxes has declined about half. This is valid evidence of the overassessment, overbonding and overtaxation of property of this county in relation to the income of the taxpayers.

It is to be hoped that the study of this problem will bring about the following reforms: (1) fix an overall bonding capacity not to exceed 25 percent of the bonding base; (2) include lease-purchase contracts in the debt limit; (3) exclude from the future bonding base all personal property; (4) make all bond proposals subject to a two-thirds vote; (5) create a central county authority to police debt and tax rate limitations.

The public is not acquainted with the real tax situation. They are not aware they have overextended indebtedness. They do not see the difference between the tax rate at $8, $9 and $10 a hundred and the old rate of $4 and $5. It does not register and they think that property under an $8 and $9 rate is just as valuable as property under a $4 rate—which, of course, is wrong.

Alan M. Firestone, Chief Deputy City Attorney for the City of San Diego stated the position of the City of San Diego is: First, that the proposed amendment should be worded so as to eliminate any language which might constitute a restriction on the use of revenue from a particular fund to pay off the interest and principal on general obligation bonds issued for the purpose of constructing a facility which results in such revenue. Second, the section of the Constitution to be amended to reduce the necessity of an affirmative vote for the issuance of general obligation bonds from two-thirds to 50 percent. Without question, it is accepted by all who are familiar with municipal financing that general obligation bonds result in less cost and expense to the citizens of the municipality than do revenue bonds. General obligation bonds invariably are sold at a smaller rate of interest than are revenue bonds. It is urgently recommended by the officers of the City of San Diego that your subcommittee revise and approve the provisions of Assembly Constitutional Amendment No. 46 to incorporate the foregoing.

Robert Andersen, County Administrative Officer of Riverside County said that Riverside County would like to go on record urging the committee to reduce the percentage necessary to pass a general obligation bond. He stated that his office had received a copy of the latest bulletin from the County Supervisors Association and they have still indicated that they were in favor of retaining the two-thirds vote, but because so many of the bond issues did fail up and down the State, they are suggesting re-evaluation of that policy and recognizing again that possibly this graduated scale (a proposal that the percentage vote required to approve a bond issue vary with the percentage of indebtedness already incurred by the taxing agency) might be the answer rather than being firm on 66⅔ percent.

W. H. Vaughn, Finance Director of the City of Santa Rosa, reiterated his statement of May 23 that a liberalization of the voting requirements needed to authorize a general obligation issue would be of immediate and long-range benefit to the citizens of the State. We respectfully request that your fullest consideration be given to reducing the required majority of 66⅔ percent to 60 percent or less.

Vincent T. Cooper, Assistant General Manager of the County Supervisors Association sent the committee a statement and asked that it be read into the record. The statement in part said the county bond issues had failed in November although 12 received majority votes.

It also stated that their present position is favorable to retention of the two-thirds requirement, but the November outcome may provide new impetus for a re-evaluation of policy. It has been suggested that a sliding scale formula be studied, for example, wherein the two-thirds voting percentage needed for approval would be slightly modified in cases where counties have not substantially utilized their bonding capacities.

Harold Raines, Attorney for the East Bay Municipal Utility District asked that his letter be read into the record of the committee. His letter in part stated that the Municipal Utility District Act is now contained in the Public Utilities Code and says no indebtedness shall be incurred exceeding the ordinary annual income and revenue of the district without the approval of a two-thirds vote of the voters voting on the proposition to incur such indebtedness.

However, the Legislature over the course of many years has set up some exceptions to the above quoted language. In other words, in certain situations specified indebtedness of a municipal utility district may be excluded in determining whether or not the district is exceeding its ordinary annual income and revenues. These exceptions are as follows: (1) the amount of previously voted bond issues; (2) refunds required to make for extensions of service; (3) the indebtedness of a special district for sewage disposal purposes set up within a municipal utility district; (4) contributions and loans from Federal Government; (5) the issuance of refunding bonds.

> "If Assembly Constitutional Amendment No. 46 should be adopted in the earlier forms in which I have seen it, all the exceptions above mentioned might be superseded by the constitutional enactment. If the East Bay District were just starting operations, this possibly would not create any serious problems. However, our financial operations have been based upon existing law for many years, and to make a sudden, sweeping change in that law might create difficulties. If Assembly Constitutional Amendment No. 46 could be amended to permit the existing statutory exceptions to remain in effect, it would be most helpful to us."

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AN ANNOTATED BIBLIOGRAPHY OF RESEARCH IN ECONOMICALLY IMPORTANT SPECIES OF CALIFORNIA FISH AND GAME

Compiled Pursuant to House Resolution No. 124, 1957

Prepared by
W. F. SCHEUERMANN, JR., *Legislative Intern*

ASSEMBLY INTERIM COMMITTEE ON FISH AND GAME
House Resolution No. 210, 1957

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LETTER OF TRANSMITTAL

Assembly Interim Committee on Fish and Game
1958

HON. L. H. LINCOLN
Speaker of the Assembly; and

MEMBERS OF THE ASSEMBLY
Assembly Chamber, Sacramento, California

GENTLEMEN: Your committee, created pursuant to House Resolution No. 210, 1957 Regular Session of the California Legislature, has the honor to submit herewith a research bibliography prepared in accordance with House Resolution No. 124, of said Session.

The bibliography has been compiled and annotated by Mr. William F. Scheuermann, Jr., a Legislative Intern assigned to the Committee by the California Legislative Internship Program. Established in 1957, the program is sponsored jointly by the California Assembly, the Ford Foundation and the five graduate universities in the State. It has as its purpose training not only in the legislative process but also in the general field of State Government and public policy for a small number of advanced graduate students, and to provide additional research services for the Assembly.

Mr. Scheuermann, prior to his selection for the intern program, was a Public Administration graduate student at the University of California, where his course of study included the Wildlife Curriculum offered by the Department of Zoology. We believe that Mr. Scheuermann has done an outstanding job on the bibliography and we are grateful to the Ford Foundation and the California Legislative Internship Program for making his services available.

Respectfully submitted,

FRANK P. BELOTTI,
Chairman

PAULINE L. DAVIS,
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AN ANNOTATED BIBLIOGRAPHY OF RESEARCH IN ECONOMICALLY IMPORTANT SPECIES OF CALIFORNIA FISH AND GAME

Compiled by
WILLIAM F. SCHEUERMANN, JR.

INTRODUCTION

Purpose

During the 1957 Regular Session of the California Legislature, Assemblyman Vincent Thomas of San Pedro introduced House Resolution No. 124, requesting in effect a review of research activities of the various agencies engaged in work relating to California fish and game. It was subsequently proposed that a comprehensive bibliography be compiled of all available research papers regarding some one hundred and forty-four species.

This bibliography is in no way a critical, technical evaluation of the research material. Rather, it is a listing of that research material and a cursory evaluation of its pertinence to the bibliography. The purpose of this compilation is to make available to the Legislature a comprehensive list that can be evaluated by a competent technical authority. Such an evaluation would be useful in considering future proposals for the management of California's fish and game, as well as pointing out areas that might require additional study and research.

The purpose of the annotation, therefore, is not to assess valuation or reliability of the reference cited, but to give a clearer and fuller notion of its content than can generally be gathered from a title or a table of contents.

Scope

One of the difficulties in compiling a bibliography of this nature is keeping it within the original scope and limits. While the species included are California fish and game, there have been occasions when the pertinence of a particular reference has been in doubt. This has been true especially in cases where agencies and institutions in other areas have made studies on species common to those areas and to California.

As far as this bibliography is concerned, the cited references are those dealing with species having a bearing on California's economy. Admittedly, the words "economically important" have also given rise to difficulties, but an attempt has been made to include as complete a coverage as possible and at the same time prevent the listing from becoming too unwieldy.

While most of the material cited is of scientific character, such sources as trade journals and popular sports magazines have not been overlooked. Excluded are strictly morphometric, morphological handbook descriptions, processing technology, marketing, folklore and purely literary references. The main emphasis has been placed upon the species' life history, habits, habitat and management.

All available material published prior to July 1958 has been included. Unpublished material of significance has also been cited. With regard to the unpublished material written by State Fish and Game employees included in this bibliography, it should be pointed out that in some of the studies there were marginal notations by other members of the agency indicating nonagreement with various conclusions and management recommendations made by the authors of those studies. It should also be understood that the recommendations do not necessarily represent the official position of the agency.

Method

Arrangement of references is chronological with authors listed alphabetically within a year group. Two or more works by one author published in the same year are given alphabetical sequence by title. The marginal date is the date of printing. Pagination is generally given only for parts of the publication pertinent to the bibliography. There are no anonymous references; those citations having no author are listed under the issuing agency.

Abbreviations are used only where their meaning is clear, and a determined effort has been made to achieve uniformity throughout. Where titles have had to be supplied, they are enclosed in brackets [ ]; where publication dates were not apparent, they are followed by a question mark (?).

The annotations, containing considerably more than could be derived from a table of contents, have been made in the author's own words as far as possible. The conclusions and recommendations contained in a particular reference are likewise in the author's own words in order to remove as much of the annotator's subjectivity as possible.

ACKNOWLEDGMENTS

Throughout the 10-month period devoted to the research and compilation, many people offered counsel and assistance without which the successful completion of the bibliography could not have been realized.

Many members of the Department of Fish and Game spent a great deal of time giving assistance and encouragement. Among those staff members to whom I give special thanks are Walter Shannon, Richard Croker, Ben Glading, Phil M. Roedel, Eldon Hughes, Leo Shapovalov, Don McLean, Leo Pinkas, Keith Cox, George McCammon, Clarkson Blunt and Tom Jow.

To N. B. Keller and F. B. Ford of the Legislative Analyst's Office, my thanks are due for guidance and direction in the initial planning of this bibliography.

No list of acknowledgments would be complete if I did not mention two people without whom the search for references would have been unnecessarily prolonged and agonizing. In compiling the bibliography, I spent two and one-half months in the Marine Resources Library at Terminal Island and six months in the Fish and Game Library at Sacramento. To Mrs. Patricia Powell and Mrs. Evelyn Oathout, my heartfelt thanks and a special bow for duty beyond the call of Librarianship.

And, to Mrs. Vivian Wherley and Mrs. Delle Reshke, sympathy and no little thanks are due for typing what at times was a difficult and unreadable manuscript.

W. F. S.

MARINE FISHES

GENERAL

Walford, L. A.
1931. Handbook of common commercial and game fishes of California. Calif. Div. Fish and Game, Fish Bull. 28, 181 p., 137 figs.

Barnhart, P. S.
1936. Marine fishes of southern California. Univ. Calif. Press, 209 p., 290 figs.

Walford, L. A.
1937. Marine Game fishes of the Pacific Coast from Alaska to the Equator. Univ. Calif. Press, 205 p., 38 figs., 69 pls.

Roedel, P. M.
1948. Common marine fishes of California. Calif. Div. Fish and Game, Fish Bull. 68, 150 p., 111 figs.

Roedel, P. M.
1953. Common ocean fishes of the California coast. Calif. Dept. Fish and Game, Fish Bull. 91, 184 p., 175 figs.

Schaefer, M. B.
1954. Some aspects of the dynamics of populations important to the management of the commercial marine fisheries. Inter-American Tropical Tuna Commission, Bull., vol. 1, no. 2, 56 p., 10 figs., 1 tbl.

Law of population growth, stability, effects of fishing, catch per unit of effort, maximum equilibrium catch, stabilization of unregulated fisheries, examples from Pacific halibut and California sardine fisheries.

California. Bureau of Marine Fisheries
1955. A preliminary report on the status of trawling for animal food in northern California, 7 p., 7 tbls. (Processed) (Available at Calif. Mar. Res. Operations, Stanford, Calif.)

Brief history of industry formerly faced with problem of catching variety of unmarketable species; first attempt to market incidentally captured and undersized fish, impetus given industry and price structure by organization of mink food producers' association, requirements of mink diet; boats and gear used, areas fished; notes 527, 923 pound landings in 1953, 1,095,879 pounds in 1954, 942,304 pounds as of August 1955; main species as sole, dogfish, rockfish and sablefish.

Note: revision and updating of report in preparation (June, 1958) by E. A. Best, to appear as "Status of animal food fishery in northern California, 1956-1957."

California Cooperative Oceanic Fisheries Investigations
1950-1958. Progress Reports. Calif. Dept. Fish and Game, Marine Research Committee.

Results of studies undertaken by various co-operating agencies; physical, chemical and biological oceanography; population recruitment research; feeding and schooling behavior, length frequencies, age determinations, spawning centers, predators and competitors, prospects for future sport and commercial fisheries.

Note: Although initiated as a sardine research project, the program now includes investigation of the Pacific mackerel, jack mackerel, anchovy and other species.

Note: Progress Report, July 1, 1953-March 31, 1955, contains "Population dynamics of the Pacific sardine," by F. N. Clark and J. C. Marr (1955); Progress Report, July 1, 1956-January 1, 1958, contains "Studies of the California current system," by J. L. Reid, Jr., G. I. Roden and J. G. Wyllie (1958).

THE SHARKS

Bonito *Isurus glaucus*
Basking *Cetorhinus maximus*
Brown smoothhound *Rhinotriacis henlei*
Soupfin *Galeorhinus zyopterus*
Blue *Prionace glauca*

Starks, E. C.
1917. The shark of California. Calif. Fish and Game, vol. 3, no. 4, p. 145-153, 15 figs.
Description of 18 sharks with habits, habitat, fishery.
Note: soupfin, p. 149; blue, p. 149-150; basking, p. 152; dogfish, p. 152-153.

Starks, E. C.
1918. The skates and rays of California, with an account of the rat fish. Calif. Fish and Game, vol. 4, no. 1, p. 1-2.
Continuation of Starks (1917), containing brief descriptive note on bonito shark in footnote 1, p. 1; fig. 1, p. 2.

Bonnot, Paul
1929. Some notes on the basking shark. Calif. Fish and Game, vol. 15, no. 2, p. 175-176.
Range, description; notes lack of knowledge.

Walford, L. A.
1935. The sharks and rays of California. Calif. Div. Fish and Game, Fish Bull. 45, 66 p., 58 figs.
Distinguishing characteristics, key to identity, common uses, distribution, importance.

Karmelich, Katherine
1937. Shark and skate. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 87-89, 2 figs.
Market demand, legends, average yearly catch, importance and uses.

Kanahoff, G. P.
1939. Stomach contents of a great blue shark. So. Calif. Acad. Sci., Bull. 38, part 3, p. 205.
A contribution to the knowledge of food habits.

Byers, R. D.
1940. The California shark fishery. Calif. Fish and Game, vol. 26, no. 1, p. 23-38, 5 figs., 1 tbl.
History, boats and gear, reduction of carcass, oil extraction, price and demand, catch analysis, regulations.

Harrison, R. W. and V. J. Salmon
1942. The Pacific coast shark and dogfish liver fisheries. *Pacific Fisherman*, vol. 40, no. 8, p. 29-31, 3 figs.
Development of fishery including fishing and handling methods, trading in livers and oil, distribution of fishery, seasonal variations in catch, effect of war conditions, species taken.
Note: Part 2 of article appears in *Pacific Fisherman*, vol. 40, no. 9, p. 37-39, and deals with handling, buying and selling, vitamin content and value, manufacture and trade in oils.
Note: supplementing these articles in phase of fishing methods is report by C. B. Carlson, "Subsurface gillnet fishing for soupfin sharks," *Pacific Fisherman*, vol. 40, no. 3, p. 33, 35; also see "Soupfin shark bottom nets, 1942-1943 model," *Pacific Fisherman*, vol. 41, no. 1, p. 18-19, 21, detailed description of construction and use of bottom net in north Pacific waters; also see "Drift nets for soupfin sharks," *Pacific Fisherman*, vol. 41, no. 4, p. 21, 23, 25, detailed description of construction and use of nets used in drifting for sharks in north Pacific; all of these mention periods of abundance, market demand, conditions affecting catch, habits and habitat.

Hart, J. L.
1942. Reproduction in the dogfish. Canada Fish. Res. Bd., Prog. Rept., no. 51, p. 16, 1 fig.
Summary of 1929-1930 unpublished manuscript report of reproductive cycle; description, fecundity; concludes that young carried for approximately two years, production less than fifteen at a time, apparently broods in alternate years.

Foerster, R. E.
1945. California soupfin shark captured in British Columbia. Canada Fish. Res. Bd., Prog. Rept., no. 64, p. 64.
Report of 1945 Vancouver Island recovery of individual tagged in 1943 by California Fish and Game in Ventura waters; first California-tagged Canadian recovery and only recovery of eighty individuals tagged.

Ripley, W. E.
1946a. The soupfin shark and the fishery. *In* The biology of the soupfin and biochemical studies of the liver. Calif. Div. Fish and Game, Fish Bull. 64, p. 7-37, 18 figs., 12 tbls.
Description of species, history and methods of fishery, catch records, sex ratio, size by regions, nursery grounds, reproductive cycle, fecundity, food; concludes that landings since 1939 on decrease, and catch-per-unit-of-effort indicates serious decline.

Ripley, W. E.
1946b. Recovery of a tagged soupfin shark. Calif. Fish and Game, vol. 32, no. 2, p. 101-102.
Notes September 1945 British Columbia recovery of specimen tagged at Ventura in July 1943, corroborating evidence indicating homogeneity of west Pacific coast population.

Phillips, J. B.
1948. Basking shark fishery revived in California. Calif. Fish and Game, vol. 34, no. 1, p. 11-23, 7 figs.
New use for liver oil as impetus for Moss Landing development; tanning, hide use, reduction to meal; specie description, habits, habitat; historical account of fishery; methods and gear; processing.

Ripley, W. E.
1949. Shark and shark livers. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 129-134, 1 fig.
History of market demand and gear, landings; soupfin and dogfish importance; 1946 revival of basking shark fishery; notes misrepresentation and substitute of meat for other species in markets and restaurants.

Roedel, P. M. and W. E. Ripley
1950. California sharks and rays. Calif. Div. Fish and Game, Fish Bull. 75, 89 p., 65 figs.
Key description and illustrations of species known in California, important commercial species; history of fishery, gear and methods; range, distribution, habits, habitat, market demand.
Note: succeeds Fish Bull. 45.

Herald, E. S. and W. E. Ripley
1951. The relative abundance of sharks and bat stingrays in San Francisco Bay. Calif. Fish and Game, vol. 37, no. 3, p. 315-329, 3 figs., 5 tbls.
Preliminary data for population study; 1950 Coyote Point derby catch data, weight, length, abundance by species, hook-hours of fishing time, tagging and releasing, food; dogfish, p. 321-322; soupfin, p. 322-325.

Ripley, W. E.
1951. Recovery of a tagged soupfin shark. Calif. Fish and Game, vol. 37, no. 4, p. 511-512.
Notes 1951 recovery at Point Dume of specimen tagged 1949 in Baja California waters; records three-inch growth in twenty-eight months and two-hundred-forty-mile northward migration.

Herald, E. S. and R. P. Dempster
1952. The 1951 shark derby at Elkhorn Slough, California. Calif. Fish and Game, vol. 38, no. 1, p. 133-134.
Catch record analysis by specie, weight, length; notes absence of dogfish.

Razum, Albert
1952. Foods of the dogfish, *Squalus acanthias*, and the brown smoothhound, *Rhinotriacis henlei*, in San Francisco Bay, California. Univ. Calif., MA thesis, 57 p., 2 figs., 35 tbls., 2 maps. (Typewritten)
Description of study area; food items by frequence and percent of volume based on 307 stomach samples; concludes that dogfish feed characteristically and to greater extent on fish, smoothhound on crustaceans; indications of relatively small area of restricted habitat; smoothhound essentially benthic, dogfish pelagic; anchovy constitutes 17.3% volume of dogfish items, bay shrimp 10.0%; shrimp constitutes 38.3% volume of smoothhound diet, anchovy 13.8%.

PACIFIC SARDINE

Sardinops caerulea (Girard)

Pacific Fisherman

1916. Pilchards appear in southeast Alaska. Vol. 14, no. 1, p. 24.
Notes catch in area.

California. Bureau of Marine Fisheries.

1921. Calif. Fish and Game, vol. 7, no. 4, p. 193-247.
Devoted to articles not directly associated with life history, ecology or management problems; differentiation of names, industry notes, methods, packing and preparation.
Note: includes W. F. Thompson, The sardine of California, p. 193-194 (differentiation in names in areas of world); W. F. Thompson, Historical review of the California sardine industry, p. 195-206; W. L. Scofield, Fertilizer, stock food and oil from sardine offal, p. 207-217; D. Higgins and H. B. Holmes, Methods of sardine fishing in southern California, p. 219-237; H. R. Beard, California sardine food production and their preparation, p. 238-247.

Dill, D. B.

1921. A chemical study of the California sardine. J. Biol. Chem., vol. 48, no. 1, p. 93-103, 5 tbls.
Analysis based on composite samples of fish taken in 1919 and 1920; average weights, composition of edible portion of sizes packed; percentage of fats and degree of sexual development relationship; notes probable relation between April migration and sudden fat decrease and remote relation between fat percentage and sea temperature; concludes that considerable variation of individual sardines of same size and from same school.

Hubbs, C. L.

1925. The California sardine. *In* Racial and seasonal variation in the Pacific herring, California sardine and California anchovy. Calif. Div. Fish and Game, Fish Bull. 8, p. 11-13, 1 tbl.
Variation of total number of vertebrae to determine possibility of individual or racial distinction; notes that 1910 specimens too premature for generalization.

Higgins, Elmer

1926. A study of fluctuation in the sardine fishery at San Pedro. *In* The California sardine. Calif. Div. Fish and Game, Fish Bull. 11, p. 124-158, 18 figs.
Seasons, monthly average size, trends, yearly and long-time size fluctuations; effects on industry of dominant year class growth and resultant shift in composition of catch; notes that San Pedro canneries draw on area from Santa Monica south to Newport Beach.

Scofield, W. L.

1926. The sardine at Monterey: dominant size, classes and their progression, 1919 through 1923. *In* The California sardine. Calif. Div. Fish and Game, Fish Bull. 11, p. 191-221, 11 graphs.
Variety in size fluctuations, seasonal and daily fluctuations; relative number of eggs spawned and successfully hatched; difference in size, classes and possible explanation.

Sette, O. E.

1926. Sampling the California sardine: A study of the adequacy of the various systems at Monterey. *In* The California sardine. Calif. Div. Fish and Game, Fish Bull. 11, p. 67-123, 10 figs., 10 tbls.
Methods of sampling daily commercial fish supply at canneries; measurements, weight, length; accuracy of standards, mean, mode, irregularities, fluctuations; concludes that "probably impossible to secure theoretically accurate representation of population at Monterey."

Thompson, W. F.
1926a. The California sardine and the study of the available supply. *In* The California sardine. Calif. Div. Fish and Game, Fish Bull. 11, p. 5-66, 18 figs., 3 tbls.

First installment of reports of comprehensive and continuous program of studying the California sardine; morphological comparison with European sardine and its races; Pacific coast distribution, seasons, catch, localities, sampling methods; investigation to detect overfishing, depletion, natural changes, careful analysis of sampling; includes much data from European fisheries.

Thompson, W. F.
1926b. Errors in method of sampling used in the study of the California sardine. *In* The California sardine. Calif. Div. Fish and Game, Fish Bull. 11, p. 159-189, 13 figs.

Discussion of errors evident from examination of data, commercial catch methods and gear; statistical errors in presentation, catch errors, selection, dominance; distribution of samples, behavior and recurrence of modes.

Andrews, C. B.
1928. Seasonal average length trends at Monterey of the California sardine. Calif. Div. Fish and Game, Fish Bull. 13, 12 p., 6 figs., 3 tbls.

Definition of progression increase in sardine length throughout season; analysis of 1917-1927 records; biological and economical factors, maturity, spawning grounds; probable hydrological and planktonic effect on movements.

Clark, F. N.
1928. The weight-length relationship of the the California sardine at San Pedro. Calif. Div. Fish and Game, Fish Bull. 12, 58 p., 11 figs., 10 tbls.

Methods of collection, statistical treatment, individual monthly and yearly fluctuations, causes of factor fluctuation, relationship as one index to condition of fish; formula derivations and factors; bibliography of scattered weight-length material.

California. Bureau of Marine Fisheries.
1929. First discovery of sardine eggs. Calif. Fish and Game, vol. 15, no. 3, p. 248-249.

Notes June 1929 discovery of spawning grounds off Point Vincent.

Conner, Geraldine
1929. Comparison of the catches north and south of the international border. *In* The commercial fish catch of California for the years 1926 and 1927. Calif. Div. Fish and Game, Fish Bull. 15, p. 50-93, 19 figs., tbls.

Statistical treatment of entire fishery from Point Conception to Cape San Lucas; landings, cannery and fresh fish, location for each species, importations, relative importance of different fish.

Hubbs, C. L.
1929. The generic relationships and nomenclature of the California sardine. Calif. Acad. Sci., Proc., vol. 18, no. 11, p. 261-265.

Morphometric comparison of European and Pacific sardine; establishes sardinops as generic name for California sardine with diagnosis thereof.

Lewis, R. C.
1929. The food habits of the California sardine in relation to the seasonal distribution of microplankton. Scripps Inst., Bull., Tech. Ser., vol. 2, no. 3, p. 155-180.

Results of commercial fishing boat collection trips and sampling of ten fish from each net haul, concurrent collection of microplankton; fluctuation of marine microplankton, effect on fish growth and habits; possible correlation between year class abundance and seasonal microplankton abundance; concludes that temperature fluctuations indirectly affect sardine abundance.

Note: see Parr (1930).

Scofield, W. L.
1929a. Sardine. *In* The commercial fish catch of California for the years 1926 and 1927. Calif. Div. Fish and Game, Fish Bull. 15, p. 23-28, 5 figs.
Cursory explanation of fluctuations; bank credits, rates of foreign exchange and purchasing power of foreign nations, California business conditions; canning industry; difference in Los Angeles and Monterey seasons and catch.

Scofield, W. L.
1929b. Sardine fishing methods of Monterey, California. Calif. Div. Fish and Game, Fish Bull. 19, 61 p., 27 figs.
Description of fishing methods, gear and industry business condition directly affecting catch; record of general development in industry with incidental mention of fishing areas, available fishing times; availability of fish; notes that generally maximum boat catch set by cannery limits and lower range set by fishing conditions.

California. Bureau of Marine Fisheries
1930. Fishing areas along the California coast for the sardine. Calif. Div. Fish and Game, Fish Bull. 25, 44 p., 25 figs., 10 tbls.
Preliminary report resulting from studies of supply; ten year field investigation; history, gear, methods; yield per area and year.

Clark, F. N.
1930a. Fishing localities of San Pedro from 1919 through 1929 for the California sardine. *In* Fishing areas along the California coast for the sardine (*Sardina caerulea*). Calif. Div. Fish and Game, Fish Bull. 25, p. 28-39, 9 figs., 6 tbls.
Increased catch, fishery extension, longer area cruises.

Clark, F. N.
1930b. Seasonal changes in the daily average length of the California sardine, *Sardina caerulea*. Calif. Div. Fish and Game, Fish Bull. 26, 20 p., 11 figs.
Supplemental to Scofield (1926b), Andrews (1928) and Higgins (1926); analysis of movement of fish in areas during seasons and effect on industry; comparison of daily average length trends; concludes a definite movement intrinsically associated with fish size and close relationship between average size of fish and number per can.

Godsil, H. C.
1930. A description of the localities in which the California sardine was taken in the San Diego region, 1928 through 1929. *In* Fishing areas along the California coast for the sardine (*Sardina caerulea*). Calif. Div. Fish and Game, Fish Bull. 25, p. 40-44, 1 fig.
Analysis of group characteristics of different populations involved at different seasons of year; size of fish related to area found.

Lindner, M. J.
1930. Fishing localities at Monterey from November 1919 through May 1929 for the California sardine. *In* Fishing areas along the California coast for the sardine (*Sardina caerulea*). Calif. Div. Fish and Game, Fish Bull. 25, p. 8-27, 12 figs., 4 tbls.
Correlation between locality, periods and size of available fish; period of scarcity; great extension of fishing grounds.

Parr, A. E.
1930. Is the presence of phytoplankton in the stomach contents of the California sardine caused by specific pursuit or merely incidental to ingestion? *Ecology*, vol. 11, no. 2, p. 465-468.
Analysis of figures forming basis of Lewis (1929) and far-reaching conclusion of that implied theory; concludes that Lewis' evidence does not bear out assumption that phytoplankton object of specific pursuit by sardine but concordant with incidental ingestion view.

Scofield, E. C. and M. J. Lindner
1930. Preliminary report of the early life history of the California sardine. Calif. Fish and Game, vol. 16, no. 2, p. 120-124, 4 figs.
Objects and procedures of hydrobiological survey; description of eggs and larvae collected.

Scofield, W. L.
1930. Sardine. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 22-24, 3 figs.
Notes greater utilization in packing plants during 1928 accounting for 81% of increase of 96 million pounds.

Clark, F. N.
1931. Dominant size groups and their influence in the fishery of the California sardine. *In* Studies of the length frequencies of the California sardine (*Sardina caerulea*). Calif. Div. Fish and Game, Fish Bull. 31, p. 7-42, 19 figs., 4 tbls.
Total length frequency data Monterey 1919-1930, San Pedro 1928-1930; progressions, deviations, frequency of appearance, modes, history of groups.

Godsil, H. C.
1931. The Commercial catch of adult California sardines at San Diego. *In* Studies of the length frequencies of the California sardine (*Sardina caerulea*). Calif. Div. Fish and Game, Fish Bull. 31, p. 45-53, 5 figs.
Compilation of results of comparative study of San Diego catch, sample data and observations; short season, irregular supply, competition from other fisheries; negligible San Diego catch; factual presentation with no analysis attempted.

Lindner, M. J.
1931. Sardine. *In* The commercial fish catch of California for the year 1929. Calif. Div. Fish and Game, Fish Bull. 30, p. 32-35, 5 figs.
Emphasizes enormous augmentation of 231,500,000 pounds over 1928 catch in spite of late 1929 closed season for the first time; alteration in Monterey gear and opening of new cannery; points out danger sign of failure of local waters to supply increasing catch, extension of fishery, expansion of period of scarcity at Monterey; contains comparison with Canadian, English, Portuguese and French industries.

Wheeler, G. C.
1931. A bibliography of the sardines. Calif. Div. Fish and Game, Fish Bull. 36, 133 p.
Compilation and brief annotation on world-wide basis.
Note: all materials pertinent to current bibliography referenced herein.

Clark, G. H.
1932. Relative destructiveness of sardine circle nets in southern California. Calif. Fish and Game, vol. 18, no. 3, p. 219-222.
Summarization of research into operation and use of nets with incidental mention of habits.

Hart, J. L.
1932. The food of the pilchard off the coast of British Columbia. Brit. Col. Comm. Fish., Rept., p. F49-F62.
Results of investigation and compilation of 250 food samples of commercial catch during the summers 1927-1930; listing of stomach contents.

Phillips, J. B.
1932. A survey of the destructiveness of sardine nets used in the Monterey region. Calif. Fish and Game, vol. 18, no. 3, p. 208-218, 5 figs.
Historical review of competition between lampara net and purse seine; habits of fish, scarcity, available fishing time.

Scofield, E. C.
1932. Recent sardine discoveries. *West Coast Fisheries*, May, p. 25-26.
Findings of 1600 mile cruise of patrol boat *Bluefin* confirming facts uncovered in 1930-31; descriptive passages of egg hatching, pro-larval stage, food, young, schooling activity; notes hesitation of laboratory to make public statements because certain points lack proof; concludes that habitat a narrow strip of coastal water, spawning migration to centralized area, 10% of eggs deposited hatch.

Clark, F. N.
1933. Changing abundance of the California sardine, measured by length of scouting time. Calif. Fish and Game, vol. 19, no. 2, p. 136-141, 6 figs.

Methods of securing data, average seasons, characteristics of Monterey and San Pedro fisheries; concludes that winter population exhibits no important changes in abundance and that fall population on decrease; recommends readjustment of fishing season for winter months concentration.

Clark, F. N.
1934. Maturity of California sardine determined by ova diameter measurements. Calif. Div. Fish and Game, Fish Bull. 42, 49 p., 19 figs., 12 tbls.

Establishes dates of spawning season, size at maturity, amount of spawning in each locality based on 3,000 female specimens, 200 eggs from each, over a 5-year period from San Pedro, Monterey, San Francisco and San Diego; history of ripening ova, frequency of spawning within season, number of eggs; concludes that more than one spawn a season, larger fish spawn more eggs at one time and ripen more batches of eggs each season than do smaller fish; spawn from February through August with height in April and May.

Hart, J. L.
1934a. Catch statistics of the British Columbia pilchard. Brit. Col. Comm. Fish., Rept., p. H54-H60, 5 tbls.

Reports attempts to establish abundance from catch statistics; yearly trends and evolution, catch per unit of effort, seasons; concludes with considerable reservation that no evidence of depletion.

Hart, J. L.
1934b. A report on the investigation of the life history of the British Columbia pilchard. Brit. Col. Comm. Fish., Rept., p. H60-H70, 8 figs., 2 tbls.

Results of investigation and effort to explain 1933 failure; extensive section on methods adopted; length, distribution, vertebrae counts, food, fishery failure; overfishing, a single year class dependency, hydrographic conditions; infers that Canada's 1933 failure related to hydrographic conditions and not result either of overfishing or of disappearance of dominant year class support.

Scofield, E. C.
1934. Early life history of the California sardine (*Sardina caerulea*) with special reference to distribution of eggs and larvae. Calif. Div. Fish and Game, Fish Bull. 41, 48 p., 24 figs., 8 tbls.

April 1929-September 1932 intensive investigations sponsored by hydrobiological survey of Hopkins Marine Station to be able to predict and to show causes of presence or absence of dominant year groups; 15,000 miles of station lines, 252,000 square miles of ocean, 358 stations between Eureka and Cape San Lucas, Baja California; determination of fairly constant maximum spawning area; notes that great bulk of sardine migrate for spawning purposes to area 200 miles long and 100 miles wide, 100 miles offshore between San Diego and Point Conception; brief study of larvae and adult food for clues to movement; description of sampling methods and specially constructed plankton nets; possible relationship between spawn and water temperature.

Clark, F. N.
1935. A summary of the life history of the California sardine and its influence on the fishery. Calif. Fish and Game, vol. 21, no. 1, p. 1-9, 2 figs.

Habitat, spawning, young, size changes, seasonal variations in survival; bibliography, p. 7-9.

Clark, G. H.
1935. The effect of gear and locality on the size of sardines taken in the Los Angeles harbor region. *In* The sizes of California sardines caught by the different fishing gear and in the different localities of the Monterey and San Pedro regions. Calif. Div. Fish and Game, Fish Bull. 43, p. 31-59, 11 figs., 8 tbls.

Results of study undertaken to determine effect on sampling system and on entire sardine investigation of changes in industry; expansion of fishing grounds, increased gear efficiency, increased boat catches, and enlargement of cannery capacity, all resulting from introduction of purse

seine; fishing areas; factors influencing sardine size; comparison of sizes by gear and area; concludes that none of three types of nets consistently catches larger average sized sardines, and no consistently average larger size by areas.

Hart, J. L.

1935. Pilchard possibilities. Canada Fish. Res. Bd., Prog. Rept. no. 24, p. 15-17, 1 fig.

Supply, dominating groups along west coast of Vancouver Island; prospects of fishery, average length, frequency curves, vertebrae counts; notes that supply constituted of one or more irregular dominant age groups rather than regular series of annual age classes of about equal abundance, leading to possible market fluctuation.

Phillips, J. B.

1935. The sizes of sardines caught by different fishing gear and in different localities of the Monterey region. *In* The sizes of California sardines caught by the different fishing gear and in the different localities of the Monterey and San Pedro regions. Calif. Div. Fish and Game, Fish Bull. 43, p. 7-30, 16 figs., 6 tbls.

Results of investigation to determine adequacy of sardine sampling system; 1929-1930 influx of purse seine boats Point Reyes through Cypress Point; gradual extension of fishing grounds; comparison of areas and catch by lampara, purse seine and ring net gear; concludes that size caught determined by availability and not type of gear and that average size not consistently smaller or larger between sections.

Note: see Phillips (1937).

Scofield, N. B.

1935. California studies to permit the maximum wise use of sardines. *Pacific Fisherman*, vol. 33, no. 9, p. 82.

Life history, variation from natural causes, development of young off sandy beaches, migration, effect of fishing in one area with regard to other areas.

Clark, F. N.

1936a. Interseasonal and intraseasonal changes in size of the California sardine (*Sardinops caerulea*). Calif. Div. Fish and Game, Fish Bull. 47, 28 p., 11 figs., 3 tbls.

Length measurements, biological years, length frequency distribution, fall and winter fisheries, fish movements, overfishing, spawning season, population composition; cannery catch at San Francisco, Monterey, San Pedro and San Diego, supplemental sampling in wholesale markets; concludes that seasonal change in size causes more intense fishery for the younger adult than for older adults, leads to scarcity of smaller sizes, leads to possible scarcity of larger sizes, leading to serious depletion of population.

Clark, F. N.

1936b. Variation in the number of vertebrae in the sardine. *Copeia*, no. 3, p. 146-150, 2 figs., 1 tbl.

Compilation and comparison of all previous vertebral counts for adults, presentation of preliminary findings for young, and suggestions for further work; number of vertebrae by locality, analysis of variance, differences in average number.

Rich, W. H. & F. W. Weymouth

1936. A review of the evidence of depletion of the California sardine. 44 p., appendices, figures. (Processed). (Available at Calif. Dept. Fish and Game, Marine Resources Library, Terminal Island, California.)

Technical report submitted to Fish and Game Commission; results of review of available evidence regarding state of fishery and an attempt to determine reliability of Bureau of Marine Fisheries' depletion conclusions; growth of industry as shown by increased catch, summary of established life history facts, review of statements and conclusions of Bureau's researchers; recommendations for controlled development of fishery; concludes that none of Bureau's criteria of depletion conclusive, but efforts to curb catch wholly justified.

Note: Appendix 2 by Vernon Brock contains investigation of sardine catches landed on floating reduction plants off California coast. See Rich (1948).

Clark, F. N.
1937a. Fishing localities for the California sardine (*Sardinops caerulea*), 1928-1936. Calif. Div. Fish and Game, Fish Bull. 48, 11 p., 5 figs.
Area comparisons, association with oceanic depth contours and distances from ports and shorelines; checker's activities at each port, actual presentation without analysis as to why fishing occurs in certain localities and not in others.

Clark, F. N.
1937b. Yield per area of the California sardine fishing grounds, 1935-1937. Calif. Fish and Game, vol. 23, no. 4, p. 307-309, 2 figs.
Tons delivered, boats engaged in fishing, tendencies of fishery, ocean contours, growth of industry and extension of grounds.

Hart, J. L.
1937a. Returns of pilchard tags applied in 1935. Canada Fish. Res. Bd., Prog. Rept. no. 31, p. 7-10, 2 figs., 1 tbl.
Records pilchard tag returns from British Columbia and California fishing grounds; outline of tag application and recovery, brief account of results and correlation of California operations and cooperations.

Hart, J. L.
1937b. Tagging British Columbia pilchard. Brit. Col. Comm. Fish., Rept., p. R49-R53, 4 figs., 1 tbl.
Methods of preliminary results of investigation to determine total extent of migration; application, recovery, and type of tags; notes strong indications of general southward fall movement.

Janssen, J. F., Jr.
1937. First report of sardine tagging in California. Calif. Fish and Game, vol. 23, no. 3, p. 190-204, 7 figs., 2 tbls.
Devoted to type of tag used, tagging method with mention of fish size and recoveries.

Phillips, J. B.
1937. Sizes of California sardines caught in the different areas of the Monterey and San Pedro regions. Calif. Div. Fish and Game, Fish Bull. 50, 31 p., 12 figs., 12 tbls.
Sequel to Phillips (1935) adding five seasons' data and reporting on new fishing area in Monterey region; shows sizes of fish that can be expected in different areas during average season; notes indications of annual southward adult movement along coast for spawning purposes fortified with findings in San Francisco, Half Moon Bay, Pigeon Point, and Monterey Bay area.
Note: see Phillips (1935).

Scofield, W. L.
1937. California sardine catch. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 11-15, 3 figs., 3 tbls.
Historical presentation of spectacular growth of dramatic fishery; stimulants to industry, slumps in catch, foreign market demands, floating reduction plants, seemingly fantastic catch figures; incidental comparison with Maine "sardine," natural fishing seasons and canning centers.

Tibby, R. B.
1937. The relation between surface water temperature and the distribution of spawn of the California sardine. Calif. Fish and Game, vol. 23, no. 2, p. 132-137, 3 figs.
Temperature threshold and metabolic activity, abundance and area of spawn, minimum and optimum temperatures.

Clark, F. N.
1938. Small sardines taken off Oregon. Calif. Fish and Game, vol. 24, no. 1, p. 71.
Records stomach analysis of albacore off mouth of Columbia River in September 1937, indicating possible spawning area as far north as Oregon and well off shore.

Hart, J. L.
1938a. A brief account of the life history of the pilchard. Brit. Col. Comm. Fish., Rept., p. T50-T56.
Condensed summary of findings to make available to Canadian fishing industry; development of fishery, spawning, eggs and young, food, catch samples, movements.

Hart, J. L.
1938b. The early returns from pilchard tagging off the west coast of Vancouver Island in 1938. Canada Fish. Res. Bd., Prog. Rept. no. 38, p. 18-20.
Report of extensive recovery at British Columbia reduction plants; evidence of mixing; notes that fishermen's impression of abundance reflects ready availability rather than actual abundance.

Hart, J. L.
1938c. Returns of pilchard tags applied in 1936 and 1937. Canada Fish. Res. Bd., Prog. Rept. no. 35, p. 9-11, 2 tbls.
Reports recovery of 86 tags, 65 Canadian and 21 Californian; locality of recovery, information on industry and fishery.

Hart, J. L.
1938d. Tagging British Columbia pilchards: insertion and recoveries for 1937 and 1938. Brit. Col. Comm. Fish., Rept. p. T57-T63, 1 fig., 3 tbls.
Detailed description of improvements in methods and techniques; record of 87 recoveries of 6936 tagged specimens; localities, distance, age; notes that recoveries indicate rapid northward migration in spring and early summery, slower fall return trip.

Janssen, J. F., Jr.
1938a. Northern recovery of California sardine tags. Calif. Fish and Game, vol. 24, no. 1, p. 70-71.
Records recovery of thirty California tagged specimens in British Columbia, Washington and Oregon canneries and reduction plants; average days out, distance traveled, estimated rate of travel.

Janssen, J. F., Jr.
1938b. Second report of sardine tagging in California. Calif. Fish and Game, vol. 24, no. 4, p. 376-390, 4 figs., 4 tbls.
Presents data gathered since Janssen (1937); type of tag used, sardine size, tag loss, mortality, fishing seasons; tagging and recovery by regions, fish movements; notes that results of two-year program support theory that nearly all spawning off southern and Lower California, young fish remain there until adolescence, and extent of migration increases with age.

Oregon. Fish Commission.
1938. Report on pilchard fishery of Oregon. 14 p., 3 figs., 2 tbls.
Three-season historical account, 1935 fishery beginning after modification of prohibition on reduction; catch, fishing fleets, grounds, plants; notes that fluctuations in size of catch due chiefly to industrial difficulties and not with relative abundance of fish.

Scofield, N. B.
1938a. Failure of pilchard to reach Canadian waters for year worries industry. *Pacific Fisherman*, vol. 36, No. 10, p. 71.
Second successive failure of pilchard to appear in volume off Vancouver Island; recounts 1937 fleet movement down the Washington Coast; notes that fish in abundance, but 1938 not as abundant because of greater competition of American fleet.

Scofield, N. B.
1938b. First sardine fishing flush. *Pacific Fisherman*, vol. 36, no. 10, p. 21.
Intensity and location of fishing fleets.

Scofield, N. B.
1938c. Northern California sardine deliveries dwindle to only 3.8% of take during the 1937 period. *Calif. Conservationist*, vol. 3, no. 3, p. 21.
Effects of stormy weather, full moon periods, strikes, scarcity of fish; catch record comparison.

Watanabe, Muneshige & J. L. Hart
1938. Sex ratio among pilchards of the Pacific coast of North America. Japanese Soc. Sci. Fish., Bull., vol. 6, no. 5, p. 237-239.
Comparison of numerical proportions and relative sizes of sexes sampled off west coast of Vancouver Island with California samples; notes probable relation with mortality and growth rate differential; concludes that female more numerous in all samples with greater discrepancy in proportions in the Vancouver Island samples.

Clark, F. N.
1939a. Can the supply of sardines be maintained in California waters? Calif. Fish and Game, vol. 25, no. 2, p. 172-176, 3 figs.
Development of yardsticks to measure relative number from year to year; fishing effort, methods of regulation.

Clark, F. N.
1939b. Measures of abundance of the sardine *Sardinops caerulea* in California waters. Calif. Div. Fish and Game, Fish Bull. 53, 45 p., 19 figs., 7 tbls.
Return per unit of effort, fall and winter fisheries, duration of superabundant groups, size changes, effect of limits and boat size increase; scouting time, extension of grounds; concludes that fishermen getting less return per unit of effort and sardine population at low ebb with severe fishing strain on badly decimated population.

Hart, J. L.
1939. Tagging British Columbia pilchards: insertion and recoveries for 1937 and 1938. Brit. Col. Comm. Fish., Rept., p. Q43-Q50.
Details of fourth season of program; illustration of uses to which tagging data may be put; movements, intensity of fishery, technique, and efficiency of tagging methods.

Janssen, J. F., Jr.
1939. 1938 recoveries of California sardine tags in northern waters. Calif. Fish and Game, vol. 25, no. 1, p. 47-48.
Time between release and recovery, average rate of travel.

Scofield, N. B.
1939a. California research wants 250,000 ton limit on pilchards. *Pacific Fisherman*, vol. 37, no. 11, p. 41.
Recounts recommendations of F. N. Clark in order to check serious decrease in population; notes that figure represents absolute maximum that would permit rebuilding of supply; overfishing reduced maximum age from ten to four years.

Scofield, N. B.
1939b. No depletion shown by sardine studies. *Pacific Fisherman*, vol. 37, no. 13, p. 69.
Announcement by U. S. Fish and Wildlife Ser. of sampling investigation; notes Secretary Ickes' statement that "sardine reasonably abundant"; final conclusions not reached.

Scofield, W. L.
1939. More recoveries from the first thousand sardines tagged. Calif. Fish and Game, vol. 25, no. 3, p. 252-253.
Notes seasonal recovery from 964 marked fish, with verification of migration conclusion and use as rough measure of fishing intensity.

Tibby, R. B.
1939. Report on returns of drift bottles released off Southern California, 1937. Calif. Div. Fish and Game, Fish Bull. 55, 36 p., 22 figs., 1 tbl.
Results of hydrographic survey designed to chart surface circulation through maximum spawning region of sardine in order materially to assist interpretation of life history problems; preparation and description of bottles and bottle stations; use of 12-oz. wine bottles, corked, sealed, and weighted with sand and carrying instructions to finder; 5,943 released and 185 recovered; concludes that drift bottles not an adequate means of charting surface flow over entire spawning region but invaluable check on dynamic computations; notes that larvae spawned inside California current will be carried along the coast to southern and Lower California and yearly variations in California current may have profound influence on survival of spawn.

Clark, F. N.
1940. The application of sardine life history to the industry. Calif. Fish and Game, vol. 26, no. 1, p. 39-48, 2 figs., 1 tbl.
Presentation of general summary of life history notes, food, size of catch, seasons, gear used, distribution, nursery grounds, fishing localities.

Hart, J. L.
1940. Tagging British Columbia pilchards: insertion and recoveries for 1939 and 1940. Brit. Col. Comm. Fish., Rept., p. K39-K41, 1 fig., 2 tbls.
Fourth in series, noting short season and small volume; reports 1939 season worst for availability of fish and of 2370 tagged, only six recoveries; summary of Washington-Oregon-California tags recovered; concludes a confirmation of regular interchange.

Foerster, R. E.
1941. The mortality of young pilchards, 1941. Canada Fish. Res. Bd., Prog. Rept. no. 48, p. 3-8.
Results of investigation of heavy mortality in January through March in British Columbia waters; bacteriological and pathological analysis of specimens; hydrographic conditions, temperature, salinity and oxygen saturation, food conditions; concludes that winter lack of adequate supply of fresh food due to natural cycle of low abundance and very large wintering population; notes that mortality affected only non-native pilchards.

Hart, J. L.
1941. Tagging British Columbia pilchards: insertion and recoveries for 1940 and 1941. Brit. Col. Comm. Fish., Rept., p. J43-J46, 1 fig., 2 tbls.
Notes reduction in recoveries due to unproductive fishery; 1940 initiation of tagging small $5\frac{3}{4}$ inch specimens.

Walford, L. A. and Kenneth Mosher
1941. Extension of pilchard spawning to north Pacific waters indicated. *Pacific Fisherman*, vol. 39, no. 3, p. 47.
Accounts of young pilchards gilled in nets offshore and in bays and inlets; samples taken and scales examined; concludes that young found in northern waters did not spend first year of life in California waters, and 1939 reproduction in northern waters unusually successful perhaps because of condition of sea.

Hart, J. L.
1942. Tagging British Columbia pilchards: insertion and recoveries for 1940 through 1942. Brit. Col. Comm. Fish., Rept., p. I45-I48, 1 fig., 1 tbl.
Report of conclusion of tagging experiment; continual recovery; weight of negative evidence; notes that unexpected successful season and large proportion of small, young fish probably due to hydrographic conditions.

Scofield, N. B.
1942. Airplane scouting of pilchard off Oregon and Washington coast. *Pacific Fisherman*, vol. 40, no. 1, p. 33.
Notes efforts of amphibian plane hired by industry to help locate schools; schooling habits, peculiarities, migration, surface appearances; success of season credited partly to scouting efforts.

Ahlstrom, E. H.
1943. Studies of the Pacific pilchard or sardine. U. S. Fish and Wildlife Serv., Spec. Sci. Rept. no. 23, 26 p., 2 figs., 2 pls., 6 tbls.
Plankton collections 1940-41 off the major spawning area; influence of temperature on rates of egg development; description of eggs, time of spawning, duration of development, water temperatures; concludes that spawn between 8 p.m. and midnight, 3 days to hatch, temperature range 12.5° to 7.6° C.

Hart, J. L.
1943a. Changes in size of fish comprising the pilchard run. Canada Fish. Res. Bd., Prog. Rept. no. 57, p. 12-14, 2 figs.
Sampling techniques in program begun in 1929; representative 100 from catches; notes that 1943 average more than two previous years but less than any other season except 1936; appreciable effects on tonnage landed.

Hart, J. L.
1943b. Report on pilchard tag recovery 1942-1943. Brit. Col. Comm. Fish., Rept., p. E43.
Notes recovery of California tag at Aristajabal Island as northern recovery record for California fish.

Sette, O. E.
1943. Studies on the Pacific pilchard or sardine. U. S. Fish and Wildlife Serv., Spec. Sci. Rept. no. 19, 27 p., 3 figs.
Reports structure of research program to determine effects of fishing; methods involved in compiling vital statistics; total catch, boat operations, boat catch records, length, scale samples; tagging research, mortality, recovery, type of tags; recruitment research egg and larvae samples, oceanographic influence, survival, spawning; lines of evidence to be gained by entire program.

Silliman, Ralph
1943a. Studies of the Pacific pilchard or sardine. U. S. Fish and Wildlife Serv., Spec. Sci. Rept. no. 24, 9 p., 2 figs., 3 tbls.
Analysis of previous derivations for fish populations, application to pilchard data and development of necessary new equations; method of computing mortality and replacements; total mortality, segregation of fishing and natural mortality, rate of recruitment, consideration of errors.

Silliman, Ralph
1943b. Thermal and diurnal changes in the vertical distribution of eggs and larvae of the pilchard. J. Mar. Res., vol. 5, no. 2, p. 118-130, 4 figs.
Successive net hauls taken southeast of main spawning areas, April, 1939 through June, 1941; ocean water layer by layer in attempt to define relationships between the vertical distribution of eggs and temperature and light intensity; classification of material; standardization of haul; concludes that positive correlation between eggs and larval concentrations and ten degrees to seventeen degrees centigrade temperature; apparent dodging of nets by larger larvae in daylight illuminated layers; negative phototropism for larger larvae indicating temperature as useful guide.
Note: also appears as U. S. Fish and Wildlife Serv., Spec. Sci. Rept. no. 22.

Walford, L. A. and Kenneth Mosher
1943a. Studies of the Pacific pilchard or sardine. U. S. Fish and Wildlife Serv., Spec. Sci. Rept. no. 20, 19 p., 32 figs., 8 tbls.
Critical inquiry into utilization of scale and otolith readings for age determination of juveniles; length frequency curves, use of scales and otoliths, growth of juveniles, size differences between localities; concludes that rings may be counted with 85% to 95% accuracy for first three year classes; otoliths less useful than scales for pilchard age determination beyond the third year; size differences noted with respect to localities may prove scale readings useful for migration studies.

Walford, L. A. and Kenneth Mosher
1943b. Studies of the Pacific pilchard or sardine. U. S. Fish and Wildlife Serv., Spec. Sci. Rept. no. 21, 29 p., 6 figs., 9 tbls.
Results of entire coast fishing areas and seasons samplings; determination of age of adults by scales, effect of environment on first year's growth; application of criteria, degree of accuracy, age count; techniques of sampling, interpretation errors, annulus recognition; concludes that age determination by scale a valid method, 80% to 90% accurate; first year growth favored by sustained presence of diatoms at optimum abundance, favored by upwelling.

Hart, J. L.
1944. Pilchard tagging and pilchard tag recoveries from 1936 through 1943. Brit. Col. Comm. Fish., Rept., p. J43-J52, 2 figs.
Summarization of 20,391 tagged, 488 recoveries; tagging recovery, treatment of data, migrations, concentrations, mortality; incorporation of additional data; concludes that considerable movement between north-

ern fishery grounds and California fishery grounds; average minimal speeds of southern migration 6.3 to 14.3 kilometers per day, total mortality of 69%.

Note: an expanded technical report appears as "Tagging experiments in British Columbia pilchards," Fish. Res. Bd., Journal, vol. 6, no 2, p. 164-182, 1943.

Clark, F. N. and J. F. Janssen, Jr.

1945a. Movements and abundance of the sardine as measured by tag returns. Calif. Div. Fish and Game, Fish Bull. 61, p. 7-42, 5 figs., 22 tbls.

First in series constituting summary of tagging program 1936 through 1940, using nickel plate internal tags recovered by electro-magnets placed in processing plant meal lines; tagging localities from British Columbia to Lower California; movements from returns, differential movements according to size, efficiency of recovery, mortality, rapidity of movement, and population estimation.

Note: see Clark and Janssen (1945b), Janssen and Aplin (1945), Ricker (1948).

Clark, F. N. and J. F. Janssen, Jr.

1945b. Measurements of the losses in the recovery of sardine tags. Calif. Div. Fish and Game, Fish Bull. 61, p. 62-90, 2 figs., 34 tbls.

Third paper in series; variable factors in tag recovery at reduction units in processing plants; number of plants with reduction units, pre-magnet contact loss, failure of magnet to attract and retain; port recovery efficiency, quick recovery and relation of tag to fishing ground; concludes that port efficiency variable, recovery varies from plant to plant and from week to week.

Note: see Clark and Janssen (1945a), Janssen and Aplin (1945), Ricker (1948).

Hart, J. L.

1945. Summary account of Canadian pilchard tag results. Canada Fish. Res. Bd., Prog. Rept. no. 64, p. 51-52.

Notes that tagging stopped but recovery continued. Age of fish, California migrations, migration distance and speed, mortality rates.

Janssen, J. F., Jr. and J. A. Aplin

1945. The effect of internal tags upon sardines. Calif. Div. Fish and Game, Fish Bull. 61, p. 43-62, 8 figs., 5 tbls.

Second paper in series; methods and success of tagging operations, methods of obtaining and caring for fish; behavior in live box, mortality determination, shedding of tags; concludes that with small tags on small fish about 60% mortality; in medium size fish 40%; death occurs within the first ten days; shedding negligible after two months.

Note: see Clark and Janssen (1945a, 1945b).

Silliman, R. P. and F. N. Clark

1945. Catch per-unit-of-effort in California waters of the sardine, 1932 through 1942. Calif. Div. Fish and Game, Fish Bull. 62, 76 p., 22 figs., 26 tbls.

Results of cooperative investigation by U. S. Fish and Wildlife Service and California Dept. Fish and Game to measure changing relationship between the numbers of available fish and amount of effort expended; between season and within season area changes, comparison of ports, effect of adjustments; port catch per boat week computed and adjusted with reference to weather, moon phases, catch limits; concludes that same changes occur in all ports through the confirmation of findings that fishery is drawing on same population for all ports and that elaborate adjustment has little effect on results.

Silliman, R. P.

1946. A study of variability in plankton tow net catches of Pacific pilchard eggs. J. Mar. Res., vol. 6, no. 1, p. 76-83, 2 figs., 3 tbls.

Results of 1940 U. S. Fish and Wildlife Service and Scripps periodic area surveys; quantitative evaluations of egg deposition; statistical analysis to gauge the significance and reliability of egg concentration estimates; methods of haul; indicates that most of variability of egg counts due to real difference in egg concentrations.

Walford, L. A.
1946. Correlation between fluctuation and abundance of the Pacific sardine and salinity of the sea water. J. Mar. Res., vol. 6, no. 1, p. 48-53, 1 fig., 4 tbls.
Daily records of salinity at La Jolla and several seasons age compositions statistics; environmental phenomena affecting early life stages; salinity closely associated with nutrient salts, presumably correlated with production of plankton organisms upon which sardines feed; finds that size of year class positively and significantly correlated with average daily summer surface salinity; concludes that salinity reflects upswelling intensity which brings up plankton nourishment; summer the most critical period in life of young sardine and time when salinity relationship most demonstrable.

Clark, F. N.
1947. Analysis of the populations of the Pacific sardine on the basis of vertebral counts. Calif. Div. Fish and Game, Fish Bull. 65, 26 p., 3 figs., 6 tbls.
Tabulation of collection and count since 1936 of adult and young sardines taken from British Columbia through Gulf of California; interpretation of the results to determine amount of intermingling on far-flung fishing grounds; description of young and adult, comparison thereof, admixture of population, variations, comparison of vertebrae count with other sardine studies; concludes that fish from Alaska through Point San Eugenio comprise mixed population with early interchange of nursing grounds; number of vertebrae varies between year classes; sardine in southern Lower California and Gulf of California constitutes separate population rarely intermingling with northern populations.

Hart, J. L.
1947. Memorandum on the pilchard situation. Canada Fish. Res. Bd. (Processed, not for publication.) (Available at Calif. Dept. Fish and Game, Marine Resources Library, Terminal Island, Calif.)
Resume of meeting between government board and industry members; summary of investigations, history of entire Pacific coast fishery, production in tons by political areas, life history, results of tagging; length and age sampling.

Pacific Fisherman
1947. 150,000-ton quota suggested to cope with California sardine situation. Vol. 45, no. 13, p. 17.
Report of meeting between San Francisco sardine industry and Bureau of Marine Fisheries; quotes R. S. Croker conclusion that overfishing a contributing factor in a seasonal failure, and that most practicable way of protecting remaining population is to set direct catch limit of 150,000 tons.

Ahlstrom, E. H.
1948. A record of pilchard eggs and larvae collected during surveys 1939 through 1941. U. S. Fish and Wildlife Ser., Spec. Sci. Rept. no. 54, 82 p., 6 figs., 11 tbls.
Delimiting possibilities of coast ranges, description of techniques involved, nets, measurement of water volume, numbers of eggs spawned per day; concludes that no eggs or larvae distributed deeper than 42 meters.

Clark, F. N.
1948. Problems connected with the management of the sardine fishery. No. Amer. Wild. Conf., Trans., p. 339-347.
Historical development of California industry, fishing methods, gear, unit of effort; summarization of biological information, restrictive legislation; suggestions for regulation and management.

Felin, F. E. and J. B. Phillips
1948. Age and length composition of the sardine catch off the Pacific coast of the U. S. and Canada, 1941-42 through 1946-47. Calif. Div. Fish and Game, Fish Bull. 69, 122 p., 1 fig., 100 tbls.
Initial publication in series reporting results of cooperative investigation by Fisheries Research Board of Canada, Province of British Colum-

bia, Washington Dept. of Fisheries, Fish Commission of Oregon, California Division of Fish and Game, and U. S. Fish and Wildlife Service; relative proportion of various age groups; collection of scales, age determination methods.

Harry, G. Y., Jr.

1948. The pilchard situation in Oregon. Oregon Fish Comm., Res. Briefs, vol. 2, no. 2, p. 17-22, 4 figs., 1 tbl.

Determination of probable causes of drastic northwest failure; sampling measure, sex, weight, age; landings 1935 through 1948; escapement from intense California fishery, dependency of Oregon fishery; poor recruitments.

Janssen, J. F., Jr.

1948. Summary of recovery of California sardine tags on the Pacific coast. Calif. Fish and Game, vol. 34, no. 1, p. 3-10, 6 tbls.

Data from 1944-45 through 1946-47 seasons and summarization of results of all recoveries; location and number of recoveries by region; concludes that returns confirm general interchange of population along Pacific coast.

Phillips, J. B.

1948. Growth of the sardine, 1941-42 through 1946-47. Calif. Div. Fish and Game, Fish Bull. 71, 33 p., 12 figs., 9 tbls.

Age and sex determination from 46,045 fish samples from commercial catch in British Columbia, Washington, Oregon and California; brief recount of life history based on earlier studies; average growth for six seasons, estimated growth curve, average annual growth, sexual differential; concludes that length, increase, progression is greater for females than males and tendency for males to retain scales longer than females.

Rich, W. R.

1948. Report of the sardine industry of California as of March, 1948. (Processed.) (Available at Calif. Dept. Fish and Game, Marine Resources Library, Terminal Island, Calif.)

Presentation of material gathered since 1936 report; brief summary of literature; abundance, recruitment, fishing intensity, restrictions; concludes that low level prevailing since 1944 due to natural fluctuations in recruitment leading to critical point economically and biologically to warrant catch limits being placed on industry.

Note: see Rich and Weymouth (1936).

Ricker, W. E.

1948. Methods of estimating vital statistics of fish populations. Indiana Univ. Press, p. 71-72.

Refers to previous research on estimation of effectiveness of fishing mortalities for California sardines; states that minimum annual rates of fishing mortality too great $\frac{(1-n)}{s}$; suggests method of correction by regrouping recoveries.

Note: see Clark and Janssen (1945a, 1945b).

Sette, O. E. and E. H. Ahlstrom

1948. Estimation of abundance of the eggs of the Pacific pilchard off Southern California during 1940 and 1941. J. Mar. Res., vol. 7, no. 3, p. 511-542, 4 figs., 3 tbls.

Results of quantitative plankton haul survey; mainly statistical explanation of methods of determination, reliability of estimates, errors introduced by interpolation, station pattern on grid system.

Smith, O. R. and E. H. Ahlstrom

1948. Echo-ranging for fish schools and observations of temperature and plankton in waters of southern California in spring of 1946. U. S. Fish and Wildlife Ser., Spec. Sci. Rept. no. 44, p. 16-17.

Results of San Francisco Sardine Association experiment in sardine scouting; suggestive relationship between water temperature and occurrence of sardine eggs; spawning areas and condition, concentration and number of eggs.

Clark, F. N.
1949. Sardines. *In* The commercial fish catch of California for the year 1947 with a historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 27-31, 1 fig., 2 tbls.
Historical presentation of fishery including 1936 through 1941 failure and financial crisis with complex reasons; demand, restrictive legislation, changing emphasis on reduction and canning, methods of fishing, increased range, and efficiency with introduction of new gear.

Felin, F. E., J. B. Phillips and A. E. Daugherty
1949. Age and length composition of the sardine catch off the Pacific coast of the United States and Canada in 1948. Calif. Fish and Game, vol. 35, no. 3, p. 165-183, 1 fig., 13 tbls.
Third report in series of cooperative counts.

Mosher, K. H., F. E. Felin and J. B. Phillips
1949. Age and length composition of the sardine catch off the Pacific coast of the United States and Canada in 1947-1948. Calif. Fish and Game, vol. 35, no. 1, p. 15-40, 1 fig., 20 tbls.
Second report covering 1947-1948 season.

Clark, F. N. and A. E. Daugherty
1950. The average lunar month catch by California sardine fishermen, 1932-1933 through 1948-1949. Calif. Div. Fish and Game, Fish Bull. 76, 28 p., 6 figs., 11 tbls.
Summation of daily landing records of individual vessels delivered between two full moons; explanation of lunar month as logical time unit for study; effect of market condition on catch limit, selection of boats for study, tonnage, average length of fish, decline of total effort; desertion of fishery 1946 and 1947.

Felin, F. E., A. E. Daugherty and Leo Pinkas
1950. Age and length composition of the sardine catch off the Pacific coast of the United States and Canada in 1949-50. Calif. Fish and Game, vol. 36, no. 3, p. 241-249, 1 fig., 9 tbls.
Fourth report in series; random distribution of scale samples.

Marr, J. C.
1950. Apparent abundance of the pilchard off Oregon and Washington, 1935 through 1943, as measured by the catch per boat. U. S. Fish and Wildlife Ser., Fish Bull. 52, vol. 51, p. 385-394, 7 figs., 2 tbls.
Difference of fishing methods and industry between Pacific coastal areas; possible effect of temperature on fishery; recognizes impossibility of separating effects of availability from abundance, and introduces term "apparent abundance" to represent combined effect.

Felin, F. E., A. E. Daugherty and Leo Pinkas
1951. Age and length composition of the sardine catch off the Pacific coast of the United States and Canada in 1950-51. Calif. Fish and Game, vol. 37, no. 3, p. 339-349, 1 fig., 8 tbls.
Fifth report in series; length frequency by sex and region, length composition by year-class, calendar dates for lunar months; age composition of catch by regions.

McHugh, J. L. and E. H. Ahlstrom
1951. Is the Pacific sardine disappearing? *Scientific Monthly*, vol. 62, p. 337-384.
Results of research carried on by Cooperative Sardine Research Program to understand sardine in relation to physical and chemical environment, food supply, predators, competitors and to evaluate findings in terms of young survival, distribution and availability of fish of commercial size; concludes that species not disappearing and that decline in abundance due to succession of poor spawning seasons coincident with change in availability or increase in natural adult mortality; indicates substantial recovery.

Pinkas, Leo
1951. Yield per area of the California sardine fishing grounds 1937 through 1949. *In* Calif. Div. Fish and Game, Fish Bull. 80, p. 9-14, 6 figs., 1 tbl.
Compilation of data to show total tonnages from numbered blocks of coastal waters without regard to port of delivery; catch recorded on chart by fishermen and supplemental check made at port giving a fairly complete history of the sardine load; fishing grounds, yield per area, relation between catch and bottom.

Clark, F. N.
1952. Review of the California sardine fishery. Calif. Fish and Game, vol. 38, no. 3, p. 367-380, 2 figs., 5 tbls.
Historical importance of industry and fishery; seasonal catch by Pacific coastal areas 1916-1952, fishing localities, major nursery grounds and spawning areas, distribution; status of population, management, effect of restrictive legislations; recommend seasonal bag limit and method of allotments, final decision by industry members.

Clark, F. N. and A. E. Daugherty
1952. Average lunar month catch by California sardine fishermen, 1949-50 and 1950-51. Calif. Fish and Game, vol. 38, no. 1, p. 85-97, 9 tbls.
Continuation of calculations; base year, boats used, limit correction, fishing success by area, relative strength of various year classes.

Felin, F. E. and others
1952. Age and length composition of the sardine catch off the Pacific coast of the United States in 1951-52. Calif. Fish and Game, vol. 38, no. 3, p. 427-436, 9 tbls.
Sixth report in series.

Groody, T. C.
1952. Behavior studies on the Pacific sardine *Sardinops caerulea* (Girard). Univ. Calif., Ph.D. thesis, 89 p., 16 figs., 11 tbls., 8 pls. (Typewritten)
Experiments at Steinhart Aquarium; transportation and maintenance; feeding behavior, importance of olfactory sense, minimum schooling unit, schooling proclivity, importance of vision, school movement patterns, respiration experiment, behavior in electrical field; concludes that young fish selectively feed on individual brine shrimp; older fish seine with gill-rakers; olfactory sense important factor in feeding; existence of strong schooling proclivity, with vision as most important factor.

Miller, D. J.
1952. Development through the prolarval stage of artificially fertilized eggs of the Pacific sardine (*Sardinops caerulea*). Calif. Fish and Game, vol. 38, no. 4, p. 587-595, 9 figs., 2 tbls.
Details of laboratory fertilization and control; methods of catch, stripping and fertilization; description of mature fish and ovary, egg and larval development; notes faster rate of development at higher temperatures and "water hardening" stage.

Phillips, J. B.
1952. Report on a survey for young sardines in California and Mexican waters, 1938 through 1940. Calif. Div. Fish and Game, Fish Bull. 87, p. 9-30, 7 figs., 4 tbls.
Results of surveys of relative abundance covering area between Bodega Head, California and Cape San Lucas, Lower California; methods of survey, stomach examination; schooling habits, surface temperature relationship.

Radovich, John
1952a. Food of the Pacific sardine, *Sardinops caerulea*, from central Baja California and southern California. Calif. Fish and Game, vol. 38, no. 4, p. 575-585, 4 tbls.
Examination of forty-two stomachs; particulate and filter nature of feeding; incompleteness of data; concludes that crustaceans form bulk.

Radovich, John
1952b. Report on the young sardine survey in California and Mexican waters 1950-51. Calif. Div. Fish and Game, Fish Bull. 87, p. 31-63, 13 figs., 22 tbls.
Results of surveys aided by radar and echo sounders assessing relative abundance of incoming age groups prior to availability on commercial fishing grounds; methods of sampling, areas surveyed, vessels, fishing mortality, water temperature, comparison of seasons, size differences in different regions, incidental reference to other fishes; predicts great number of unknown variables prevent calculations of total population or availability measures; indicates 1940 and 1950 not strong year classes and not likely that fishing will improve in 1952, 1953 or 1953-54.

Pacific Fisherman
1952. Sardine bag limit key point in legislative package deal. Vol. 50, no. 6, p. 17.
Report of the Fish and Game Commission management program, record of landings for previous year and composition of catch; quotes R. S. Croker as saying, "California sardine will come back eventually. Ocean is too large to be fished out and the sardines are too numerous to be wiped out as a species by any combination of factors."

Felin, F. E. and others
1953. Age and length composition of the sardine catch off the Pacific coast of the United States and Mexico in 1952-53. Calif. Fish and Game, vol. 39, no. 3, p. 409-417, 7 tbls.
Seventh report in series.

Landa, Antonio
1953. The relationship between body length and scale length in five-year classes of the Pacific pilchard or sardine. *Pacific Science*, vol. 7, no. 2, p. 169-174, 4 tbls.
Consideration of applying scale rings to back-circulation of length; co-variance analysis of regression of scale length and difference between regression constant.

Walker, B. W.
1953. New records of Pacific sardine and Pacific mackerel in the Gulf of California. Calif. Fish and Game, vol. 39, no. 2, p. 263-264.
Reports of tuna fishermen, UCLA and Stanford University zoology departments collection; notes difference in abundance of young specimens for different dates; establishes presence on mainland side of Gulf.

Ahlstrom, E. H.
1954. Distribution and abundance of eggs and larvae populations of the Pacific sardine. U. S. Fish and Wildlife Ser., Fish. Bull. 93, vol. 56, p. 83-140, 32 figs., 13 tbls.
Results of quantitative plankton hauls taken at regular intervals over extensive grid of stations off California and Baja California as part of Cooperative Oceanic Fisheries Investigation to determine factors responsible for fluctuations in abundance, distribution and availability; recounts spawning surveys of 1949-1951; statistical explanation, geographical distribution of eggs, distribution of spawning in time, distribution, abundance and survival of larvae; concludes that existence of compact area of intense spawning off central Baja California and larger area of diffuse spawning off southern California; occurs mostly 12.5° through 16.5° C., April through June; minimal survival estimate 1 in 1000.

Croker, R. S.
1954. Loss of California sardine fishery may become permanent. *Outdoor California*, vol. 15, no. 1, p. 1, 6-7, and 8.
Popular treatment of industry's collapse, annual landings, area shortages, need for curtailment; discusses research program.

Felin, F. E. and others
1954. Age and length composition of the sardine catch off the Pacific coast of the United States and Mexico in 1953-54. Calif. Fish and Game, vol. 40, no. 4, p. 423-431, 8 tbls.
Eighth in series.

Mosher, K. H. and H. H. Echles
1954. Age determination of Pacific sardines from otoliths. U. S. Fish and Wildlife Ser., Res. Rept. 37, 40 p.
Results of independent readings of scales and otoliths from 500 specimens of San Francisco fishery; comparison with fish length leading to establishment of validity of otolith use; includes determination of adult ages landed between 1932 and 1938 at Monterey and San Pedro and between 1934 and 1935 in British Columbia; data for numbers of sardines landed, age and length composition, year class strength and survival.

Felin, F. E. and others
1955. Age and length composition of the sardine catch off the Pacific coast of the United States and Mexico in 1954-55. Calif. Fish and Game, vol. 41, no. 4, p. 285-293, 8 tbls.
Ninth in series.

Iwai, Tamotsu
1955. The pharyngeal pockets of the sardine, *Sardinops caerulea* (Girard). Calif. Fish and Game, vol. 41, no. 1, p. 113-116, 3 figs.
Constitutes first contribution to study of anatomical features of gill process and alimentary tract to determine possibility that species obtain nourishment from nannoplankton or dissolved nutrients in sea water; importance in estimating relationship between abundance and sources of food; description, location of pockets; notes undetermined function of pockets but suggests contribution to concentration and swallowing of food.

Clark, F. N.
1956. Average lunar month catch of sardine fishermen in southern California, 1932-33 through 1954-55. Calif. Fish and Game, vol. 42, no. 4, p. 309-322, 3 figs., 7 tbls.
Methods, unit of measure and effort, selection of boats; year class strength.

Clothier, C. R. and E. C. Greenhood
1956. Jack mackerel and sardine yield per area from California waters, 1946-47 through 1954-55. Calif. Dept. Fish and Game, Fish. Bull. 102, p. 12-16, 7 figs., 2 tbls.
Catch localities for six seasons with major and minor concentrations; close association with jack mackerel fishery during 1952-53 and 1953-54 seasons.

Pacific Fisherman
1956a. Sardines continuing comeback. Vol. 54, no. 3, p. 7-8.
Notes moderate manifestation of 1955 comeback despite restricted fishing due to strike and stoppage; export market increased; new addition of night airplane scouting.

Pacific Fisherman
1956b. Sardine fishing fair for first dark of season. Vol. 54, no. 12, p. 23.
Records landings for first dark ending October 17 and location of best fishing as well along coast toward San Diego with best schools off La Jolla and Del Mar.

PACIFIC HERRING

Clupea pallasi

(There is much literature on British Columbia, Washington and Alaska fisheries that might be of value for comparison and lines of investigation, but not included here. This will be devoted entirely to the California fishery. Important as it is elsewhere, the herring fishery in California has never been extensively developed.)

Scofield, N. B.

1918. The herring and the development of the herring industry in California. Calif. Fish and Game, vol. 4, no. 2, p. 65-70, 6 figs.

Range, abundance, migration, spawning; methods of fishing, marketing, value.

Starks, E. C.

1918. The herrings and herring-like fishes of California. Calif. Fish and Game, vol. 4, no. 2, p. 59-65, 9 figs.

Descriptive study with incidental mention of range, seasonal abundance, fisheries.

Wilson, Dorothy

1937. Herring. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 16-18, 1 fig.

Distribution, methods of catch, spawning movements, productive areas, fresh fish market demand, bait, Tomales Bay curing, effect of 1919 reduction act; landings 1916-1935; concludes that supply apparently not overtaxed, industry could develop.

Hughes, E. P.

1949. Pacific herring. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 101-102, 1 fig.

Range, importance to ocean economy, landings; 1947 attempt to can and failure to meet buying standards, testing of new canning processes.

Fry, D. H., Jr.

1955. Role of the herring in California's fishery. *Outdoor California*, vol. 16, no. 12, p. 8, 11, 1 fig.

Account of dramatic spawning waves into San Francisco and Tomales Bays, egg deposition, predation by gulls and salmon; fishing areas, intensity, methods; catch records and fluctuations; concludes that Tomales Bay population small, easily available and prone to overfishing in short time; San Francisco Bay population less likely to be overfished; Monterey Bay population presumably spawn in San Francisco area.

Miller, D. J. and John Schmidtke

1956. Report on the distribution and abundance of Pacific herring (*Clupea pallasi*) along the coast of central and southern California. Calif. Fish and Game, vol. 42, no. 3, p. 163-187, 9 figs., 6 tbls.

History of fishery, impetus from sardine failure, catch records 1916-1954; reduction, canning, pet food uses; distinction between Atlantic or European and Pacific species; length frequencies, age composition, spawning, spawning distribution and incubation, pre- and post-spawning behavior, subpopulations; methods of 1955 population survey; spawning areas in California, population estimates; concludes that California population of relatively small magnitude; main utilization of San Francisco and Tomales Bays for spawning; sporadic year to year spawning resulting in fluctuating population.

Merkel, T. J.

1957. Food habits of the king salmon, *Oncorhynchus tshawytscha* (Walbaum), in the vicinity of San Francisco, California. Calif. Fish and Game, vol. 43, no. 4, p. 249-270, 4 figs., 8 tbls.

Analysis of 1004 stomach contents; concludes that Pacific herring constitute 12.7% of total food consumed, regardless of salmon size.

ANCHOVY

Engraulis mordax mordax
Anchoa compressa
Anchoa delicatissima

Eigenmann, C. H.
1892. The fishes of San Diego, California. U. S. Nat. Mus., Proc., p. 137-149, Plates 10-18.
Account of personal market observations December 1888-March 1890; notes no distinction between *E. mordax* and *A. delicatissima;* food habits as crustacea and larval fishes; pelicans as predators; detailed description of egg development.

Smith, H. M.
1894. Notes on a reconnaissance of the fisheries of the Pacific coast of the United States in 1894. U. S. Fish Comm., Bull., p. 14-18, 227, 283.
Abundance along entire coast; notes enormous quantities in Puget Sound and San Francisco; called "sardine" in Puget Sound; most abundant fish in San Francisco markets 1894.
Note: classifies as *Stolephorus ringens;* synonymity authenticated by Mr. Leo Pinkas, Calif. Marine Resources Laboratory, Terminal Island, and by List of Fishes (1949) by W. I. Follett, Calif. Acad. Sci.

Starks, E. C.
1918. The herrings and herring-like fishes of California. Calif. Fish and Game, vol. 4, no. 2, p. 59-65, 9 figs.
Descriptive study with incidental mention of range, seasonal abundance, fisheries.

Hubbs, C. L.
1925. The California anchovy. *In* Ratio and seasonal variations in the Pacific herring, California sardine and California anchovy. Calif. Div. Fish and Game, Fish Bull. 8, p. 14-21, Table 13, Plate 4.
Deals chiefly with vertebral counts; annual and seasonal variations in central and southern California; correlates individual variations and environmental factors; concludes that district subspecies *E. m. nanus* inhabits San Francisco Bay, typical brackish water race analogous to Baltic race of Atlantic herring; California anchovy divisible into two sharply defined races, *E. m. mordax* and *E. m. nanus.*

Bolin, Rolf
1936. Embryonic and early larval stages of the California anchovy. Calif. Fish and Game, vol. 22, no. 4, p. 314-321, 4 figs.
Attempt to make possible ready identification; description of egg and young development through yolk sac stage fifteen days after hatching; indicates year-round spawn in Monterey Bay; notes peculiar regular egg laying about ten at night; mentions unsuccessful laboratory rearing experiment.

Fry, D. H., Jr.
1937. Anchovy. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 15-16, 1 fig.
Commercial landing figures, brief analysis of area catch and use; notes that greatest part of catch used as live bait not brought ashore, not reflected in records.

Croker, R. S.
1942. Latent marine fisheries resources of California and western Mexico. Calif. Fish and Game, vol. 28, no. 4, p. 175-181.
General discussion of entire fishery; notes that anchovy abundance would support rather large-scale canning operation and that fishery could be expanded to considerable degree; "development held back by consumer and government buying agencies' refusal to try anything new."

Hilderbrand, S. F.
1943. A review of the American anchovy (family *Engraulidae*). Bingham Ocean. Coll., Bull., vol. 8, art. 2, 165 p.
Attempt to clarify classification confusion and tangled synonymy; taxonomic treatise but incidental comments on economic importance and distribution.

Chapman, W. McL.
1944. The osteology of the Pacific deep-bodies anchovy, *Anchoa compressa*. J. Morph., vol. 74, no. 2, p. 311-329, 15 figs.
Detailed examination of axial skeletons and investigation of genus *Anchoa;* synopsis of family *Engraulidae*.

Ahlstrom, E. H.
1948. A record of pilchard eggs and larvae collected during surveys made in 1939-1941. U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries no. 54, 76 p., 6 figs., 11 tbls.
Largely concerned with putting investigation of recruitment on basis of quantitative accuracy; collaboration with Scripps Institute in conjunction with investigation of hydrographic conditions off Pacific coast; explanation of haul technique; notes characteristics distinguishing anchovy larvae from sardines

Marr, J. C. and E. H. Ahlstrom
1948. Observations on the horizontal distribution and numbers of eggs and larvae of the northern anchovy (*Engraulis mordax*) off California in 1940 and 1941. U. S. Fish and Wildlife Ser., Spec. Sci. Rept. no. 56, 13 p., 4 tbls.
Special data taken on survey hauls by 0.5 meter nets; spawning distribution.

Phillips, J. B.
1949. Anchovy. *In* The commercial fish catch of California for the year 1947 with a historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 89-90, 1 fig.
General survey; discussion of 1946 inception of canning traced to sardine scarcity.

McHugh, J. L.
1951. Meristic variations of populations of northern anchovy (*Engraulis mordax mordax*). Scripps Inst., Bull., vol. 6, no. 13, p. 123-160, 9 figs.
Results of study to determine extent of variation in space and time of morphological characters in order to interpret population structure of subspecies; accurate count of meristic characters other than number of vertebrae; concludes that northern anchovy ranges from British Columbia to southern Baja California; probably equals or exceeds Pacific sardines in numbers; relatively unexploited resource; three populations with no complete intermingling.

Ahlstrom, E. H.
1952. Pilchard eggs and larvae and other fish larvae, Pacific coast, 1950. U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries no. 80, 58 p., 2 figs., 7 tbls.
First in series of reports recording quantitative sampling between Columbia River and Punto Abreojos, Lower California, extending 350 to 400 miles offshore, designed primarily to yield information on sardine; information on other species partially incidental although not unexpected byproduct; Table 4 contains anchovy larvae count enumerated by size categories.

Note: see Table 4 of following in series for anchovy information:
U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries no. 102 (Ahlstrom 1953), no. 123 (Ahlstrom 1954), no. 155 (Ahlstrom and Kramer 1955), and no. 186 (Ahlstrom and Kramer 1956).

Clark, F. N. and J. B. Phillips
1952. The northern anchovy (*Engraulis mordax mordax*) in the California fishery. Calif. Fish and Game, vol. 38, no. 2, p. 189-207, 7 figs., 7 tbls.
Compilation of five-year accomulation of data begun in 1946 because of tonnage trebling; results of sardine failure; methods, gear, success; live bait industry, canning process; size, length frequency, weight-length relationship, age and growth, maturity.

Johnson, W. C. and A. J. Calhoun
1952. Food habits of California striped bass. Calif. Fish and Game, vol. 38, no. 4, p. 531-534, 2 tbls.
Analysis of 387 stomach contents collected in San Francisco Bay region; concludes that anchovy represents 39% total summer volume.

Razum, Albert
1952. Food of the dogfish, *Squalus acanthias*, and the brown smoothhound, *Rhinotriacis henlei*, in San Francisco Bay, California. Univ. Calif., MA thesis, 57 p., 2 figs., 35 tbls., 2 maps. (Typewritten)
Description of study area; food items by frequency and percent of volume based on 307 stomach samples; concludes that dogfish feed characteristically and to greater extent on fish, smoothhound on crustaceans; indications of relatively small area of restricted habitat; smoothhound essentially benthic, dogfish pelagic; anchovy constitutes 17.3% volume of dogfish items, bay shrimp 10.0%; shrimp constitutes 38.3% volume of smoothhound diet, anchovy 13.8%.

Hubbs, C. L.
1953. Identification and relationships of the anchovy described from California as Anchovia scitula. *Copeia*, no. 3, p. 193-194.
Re-examination of evidence of species validity based on one specimen; notes range, number of gill rakers; concludes not example of *Engraulis mordax*.

Miller, D. J and others
1955. Age determination of the northern anchovy *(Engraulis mordax)*. Calif. Dept. Fish and Game, Fish Bull. 101, 66 p., 19 figs., 40 tbls.
Research and statistical results of studies indicated to be needed by Clark and Phillips (1952); scale readings, structure, annuli; scale length-fish length relationship, growth patterns, validity of methods; tonnages and numbers taken; concludes that species relatively short lived with rapid population turnover; unmeasurable degree of error.

Miller, D. J.
1956. Anchovy study shows gain in southern waters. *Outdoor California*, vol. 17, no. 12, p. 3, 8-9.
Age composition, downward population fluctuation; notes negligible effect of fishing pressure on population; increase in either spawning, population or rate of survival; lessened economic demand; concludes migration to southern California from central area; two populations north and south of Cape San Martin.

Merkel, T. J.
1957. Food habits of the king salmon, *Oncorhynchus tshawytscha* (Walbaum) in the vicinity of San Francisco, California. Calif. Fish and Game, vol. 43, no. 4, p. 249-270, 4 figs., 8 tbls.
Analysis of 1004 stomach contents of specimens caught by trolling; concludes that anchovy constitutes 29.1% of total food consumed, regardless of salmon size.

THE TRUE SMELTS

Whitebait smelt *Allosmerus elongatus*
Surf smelt *Hypomesus pretiosus*

Schaefer, M. B.
1916. Contribution to the life history of the surf smelt in Puget Sound. Wash. Dept. Fish., Biol. Rept. no. 35b, 45 p., 33 figs., 17 tbls.
Results of 1935 investigation; spawning areas and season, fishery, commercial catch statistics, migration and spawning, frequency of spawn, fecundity, larvae development, age and size composition, effects of regulation.

Thompson, W. F. and others
1936. The spawning of the silver smelt, *Hypomesus pretiosus. Ecology*, vol. 17, no. 1, p. 158-168, 2 figs., 3 tbls.
Records 1932 observation of spawning act near Aberdeen, Washington; correlation with wave action, composition of population, runs, adaptation to environmental conditions.

Clark, F. N.
1937. Smelt and whitebait. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 89-90, 1 fig.
Landings 1916-1935 reflecting economic conditions; complexities of compiling records, species comprising catch, area emphasis of different fishing methods.

Loosanoff, V. L.
1937. The spawning runs of the Pacific surf smelt. International Review Hydrobiologie und Hydrographie. Band 36, Heft 1 and 2, p. 170-183, 3 figs.
Description, range, age at spawning, relative abundance of sexes, development of eggs, favorable tidal elevations; based on Puget Sound studies.

Aplin, J. A.
1949. Whitebait. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 142-144, 2 figs.
Demand in northern California ports, catch records, reflection of demand rather than abundance, American Indian fishing methods.

Yapchiongco, J. V.
1949. *Hypomesus pretiosus:* its development and early life history. Univ. Philippines, Natural and Applied Sciences Bull., vol. 9, no. 1, p. 1-108, 38 figs., 8 tbls.
Results of 1930-1940 Puget Sound study; spawning process and seasons, fecundity, topography of beach, size and age composition, reproductive organ, egg and larvae development; summary of previous studies.

Scofield, W. L.
1952. Packaged "Silver Smelt." Calif. Fish and Game, vol. 38, no. 1, p. 134-135.
Account of 1951 increase in tonnage packaged for freezing and fresh fish trade; Noyo and Russian river mouths as primary catch location; methods of catch with Indian dip net; notes 1950 impetus of less than normal Washington run.

FLATFISHES

GENERAL

Starks, E. C.

1918. The flat fishes of California. Calif. Fish and Game, vol. 4, no. 4, p. 161-179, 22 figs.

Descriptive study with incidental mention of range, seasonal abundance, fishery.

PACIFIC SANDDAB

Citharichthys sordidus (Girard)

Clark, G. H.

1937. Sanddab. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 39-40, 1 fig.

Landings 1916-1935, methods of catch, indications of depletion.

Ripley, W. E.

1949. Sanddab. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 72, 1 fig.

Landings, 1916-1947, composition of catch, areas of important landing, gear used.

Arora, H. L.

1951. An investigation of the California sanddab *Citharichthys sordidus* (Girard). Calif. Fish and Game, vol. 37, no. 1, p. 3-42, 28 figs., 7 tbls.

Description of species, range, bathymetric occurrence; length, egg measurements, scale and otolith studies, age, growth, maturation, length-weight relationship; concludes that spawning season July to early September, with peak in August; rarely exceeds two pounds.

Note: condensation of Ph. D. thesis, Stanford Univ., 1948.

CALIFORNIA HALIBUT

Paralichthys californicus (Ayres)

Rankin, E. P.

1915. The halibut fishery of the Pacific coast. Calif. Fish and Game, vol. 1, no. 3, p. 116-119.

Brief description of gear and methods based on research by U. S. Bureau of Fisheries; description of fish, size, slight information regarding spawning and food habits, habitat, range abundant areas.

Higgins, Elmer

1919. Some problems in the study of the life history of California halibut. Paper presented at Univ. Southern Calif., Venice Mar. Biol. Station, summer class. (Typewritten) (Available at Calif. Dept. Fish and Game Library, Terminal Island, Calif.)

Discussion of fishery, condition, fish habits, life history, abundance, spawning, fecundity, what can be expected without protection.

Whitehead, S. S.

1929. Northern and southern halibut. *In* The commercial fish catch of California for the years 1926 and 1927. Calif. Div. Fish and Game, Fish Bull. 15, p. 35-37, 2 figs.

Distinction of Pacific and California species, yearly catch trends.

Babcock, J. P.

1930. Halibut—some facts about the king of the bank. Calif. Fish and Game, vol. 16, no. 1, p. 39-42.

Devoted entirely to British Columbia and Alaskan populations; range, spawn, development, maturity, migration.

Note: reprinted from *Canadian Fisherman*, vol. 16, no. 8, p. 13-14 (1929).

Clark, G. H.

1930a. Halibut. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 54-56, 5 figs.

Catch record indications; notes that decline perhaps due to overfishing and depopulation of banks of young before spawning.

Clark, G. H.

1930b. California halibut. Calif. Fish and Game, vol. 16, no. 4, p. 315-317, 1 fig.

Results of boat catch analysis instigated to determine cause of 1929 decrease in total landings; life history notes, fishing methods; recommends more restrictive legislation to protect; closed season during spawning period; size and fishing gear limitations.

Clark, G. H.

1931. The California halibut and an analysis of the boat catches. Calif. Div. Fish and Game, Fish Bull. 32, 52 p., 25 figs., 15 tbls.

General historical survey of fishery, gear, geography, legislation; fishing apparatus, men, operations, areas; life history and conservation notes; catch per trip, unit of effort, equalization of boat catches; concludes that depletion in San Pedro area evident from decreasing catch per unit of effort, constant area extension, increasing price, fishermen going into other fisheries; entire California fishery in need of protection; recommends prohibition of fishing between April and May to protect spawners.

Holmberg, E. K.

1949. California halibut. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 75-77, 1 fig.

Brief survey of range, fishing methods and fishery condition; debates whether total landings reflect condition of fishery or economy of country; notes that San Francisco market receipts made out as halibut without California and Pacific speciation; all data since 1936 adjusted to reflect observed nine-to-one ratio of Pacific to California species; Santa Barbara receipts do not reflect many undersized specimens recorded as sole.

McKeever, K. L.

1958. Albinism and ambicoloration in the California halibut (*Paralichthys californicus*). Calif. Fish and Game, vol. 44, no. 2, p. 171-174, 2 figs., 1 tbl.

Description of specimens landed in southern California water in 1956; deviations from normal, counts and measurements.

SOLE

Petrale *Eopsetta jordani* (Lockington)
English *Parophrys vetulus* Girard
Dover *Microstomus pacificus* (Lockington)
Rex *Glyptocephalus zachirus* Lockington

Bonnot, Paul
1931. Flat-fish eat crabs. Calif. Fish and Game, vol. 17, no. 2, p. 225-226.
Results of stomach content analysis of specimens taken off Eureka; notes eighty-foot depth for crabs.

Clark, G. H.
1937. Sole. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 41-42, 1 fig.
Catch composition, methods and history of fishery, ports, landings 1916-1935.

Budd, P. L.
1940. Pointed-nosed sole (English sole). *In* Development of the eggs and early larvae of six California fishes. Calif. Div. Fish and Game, Fish Bull. 56, p. 10-20, 3 pls.
Results of specimens examined in Monterey fish markets and collected by *Albacore;* description of eggs, larvae, blastodisc, cleavage, invagination, length, pigmentation.

Hagerman, F. B.
1949. Tagged flatfish recovered at Eureka. Calif. Fish and Game, vol. 35, no. 4, p. 328.
Notes two recoveries of specimens tagged by Oregon Fish Commission at Columbia River; length, weight, growth, distance traveled, time out.

Ripley, W. E.
1949. Sole. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 66-70, 1 fig.
Habitat, catch methods, ports, percentage of catch by species, development of new techniques; notes Dover catch increase.

Hagerman, F. B.
1952. A biology of the Dover sole. Calif. Dept. Fish and Game, Fish Bull. 85, 38 p., 28 figs., 7 tbls.
Results of study of 3200 specimens from Eureka fishermen and dealers to obtain facts required for reasonable regulation; history of fishery; description of species, range, length, frequency, length-weight relationship, age and rate of growth, fecundity, maturity, egg and young development, migration, food habits, conservation measures; concludes great survival potential with heavy exploitation because deep-water migration and winter storms characteristic of fishing areas result in seasonal unavailability.

Manzer, J. I.
1952. Notes on dispersion and growth of some British Columbia bottom fish. Canada Fish. Res. Bd., J., vol. 8, no. 5, p. 374-377, 1 fig., 1 tbl.
Data from recoveries of tagging work begun in 1943; movements, mileage, market demand and fishing intensity.

McCormick, R. B. and W. J. Baldwin
1952. Golden Dover sole taken at Eureka. Calif. Fish and Game, vol. 38, no. 1, p. 134.
Description of specimen taken by drag boat; length, weight, bathymetrics; notes ocular side coloration as extremely rare xanthocroism.

Best, E. A.
1957. Tagged Dover sole *(Microstomus pacificus)* at liberty six years. Calif. Fish and Game, vol. 43, no. 2, p. 147.
Records tagging and recovery of specimen in vicinity of Mad River mouth; type of tag used; notes 2234 days out and less than 25 miles net movement.

STARRY FLOUNDER

Platichthys stellatus (Pallas)

California. Fish and Game Commission
1916. Flounders eat clam necks. Calif. Fish and Game, vol. 2, no. 3, p. 151.
Record of Tomales Bay predation based on stomach content analysis.

Clark, G. H.
1937. Starry flounder. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 40-41, 1 fig.
Distribution, habitat, landings 1916-1935, gear and methods.

Ripley, W. E.
1949. Starry flounder. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 70-72, 1 fig., 1 tbl.
Landing fluctuations, importance to sportsmen.

Orcutt, H. G.
1950. The life history of the starry flounder. Calif. Div. Fish and Game, Fish Bull. 78, 64 p., 52 figs., 14 tbls.
Results of study of specimens collected from Elkhorn Slough, mouth of Salinas River and various points in Monterey Bay 1946-1948; systematic position, distribution, habits, habitat, food spawning, embryologic and larvae development, age determination, rate of growth, maturity, geographical variations, fishery; concludes stable population able to support considerably higher fishing pressure; also occupies strictly freshwater habitat.

Manzer, J. I.
1952. Notes on dispersion and growth of some British Columbia bottom fish. Canada Fish. Res. Bd., J., vol. 8, no. 5, p. 374-377, 1 fig., 1 tbl.
Data from recoveries of tagging work 1943; movements, mileage, market demand and fishing intensity.

TURBOT

Diamond *Hypsopsetta guttulata* (Girard)
Curlfin *Pleuronichthys decurrens* Jordan & Gilbert
Horneyhead *Pleuronichthys verticalis* Jordan & Gilbert

Clark, G. H.
1937. Turbot. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 40, 1 fig.
Catch composition, method of catch, estimation of 30% "sole" catch in Santa Barbara being turbot.

Budd, P. I.
1940. Horneyhead and curlfin turbot. *In* Development of the eggs and early larvae of six California fishes. Calif. Div. Fish and Game, Fish Bull. 56, p. 21-32, 4 pls.
Results of specimens examined in Monterey fish markets and collected by *Albacore;* description of eggs, larvae, blastodisc, cleavage, invagination, length, pigmentation.

Ripley, W. E.
1949. Turbot. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 72-75.
Catch composition, major Southern California area landings, erratic character of catch.

CALIFORNIA BLACK SEA BASS

Stereolepis gigas Ayres

Starks, E. C.

1919. The basses and bass-like fishes of California. Families *Serranidae, Haemulidae, Kyphosidae.* Calif. Fish and Game, vol. 5, no. 2, p. 59-68, 9 figs.
Descriptive study with incidental mention of range, seasonal abundance, fishery.

Higgins, Elmer

1920. The young of the black sea bass. Calif. Fish and Game, vol. 6, no. 1, p. 5-6, 2 figs.
Descriptive note of *Albacore* haul off Southern California.

Croker, R. S.

1937. Black sea bass. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 76-77, 2 figs.
Importance to fresh fish market and sport fishery; methods and gear, catch in Mexican and California waters; trends.

Fitch, J. E.

1949. Black sea bass. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 124-126, 1 fig.
Extent of fishery, productive areas, methods of catch, total landings 1916-1947.

ROCK BASS

Kelp bass *Paralabrax clathratus*
Sand bass *P. nebulifer*

Starks, E. C.

1919. The basses and bass-like fishes of California. Families *Serranidae, Haemulidae, Kyphosidae.* Calif. Fish and Game, vol. 5, no. 2, p. 59-68, 9 figs.
Descriptive study with incidental mention of range, seasonal abundance, fishery.

Clark, F. N.

1933. Rock bass (*Paralabrax*) in the California commercial fishery. Calif. Fish and Game, vol. 19, no. 1, p. 25-35, 9 figs., 3 tbls.
Results of a study undertaken to determine advisability of prohibiting commercial take of species; fishing regions, seasons, and gear; fluctuations in available supplies; discussion of kelp, rock and spotted rock bass, contribution to catch; spawning, maturity, size range; concludes that closing species to commercial fishing would provide little hardship on industry and do little for conservation; recommends no commercial protection.

Clark, F. N.

1937. Rock bass. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 81-82, 1 fig.
Range, area of catch, season, gear and methods; World War I impetus, marketing conditions, trends; notes incidental take by commercial boats leading to fluctuations not reflecting abundance.

Collyer, R. D.

1949. Rock bass. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 113-114, 1 fig., 1 tbl.
Months of largest landings, extent of grounds, common habitat, limited market demand, gear; comparison in poundage taken by commercial and sport boats; notes abrupt rise in sport catch as a result of more complete records collected.

Collyer, R. D. and P. H. Young

1953. Progress report on a study of the kelp bass, *Paralabrax clathratus.* Calif. Calif. Fish and Game, vol. 39, no. 2, p. 191-208, 9 figs., 6 tbls.
Report of tagging program and life history study initiated in 1950; tag of 4,172 and recovery of 500 specimens; catch records 1936-1951, size of fish on different fishing grounds; length frequency distribution, movement, growth, maturity; concludes that fishery probably based on series of independent populations; spawn May-August.

THE SILVERSIDE FAMILY

Jacksmelt Atherinopsis californiensis
Topsmelt Atherinops affinis

Hubbs, C. L.
1918. The fish of the Genus *Atherinops*, their variation, distribution, relationships and history. Amer. Mus. Nat. Hist., Bull., vol. 38, art. 13, p. 409-440, 19 tbls.
Localizations, subspecies, integradations, phylogeny, range, habits, breeding areas, nomenclature.

Clark, F. N.
1929. The life history of the California jacksmelt, *Atherinopsis californiensis*. Calif. Div. Fish and Game, Fish Bull. 16, 22 p., 12 figs., 1 tbl.
Commercial catch statistics, gear, descriptions of ovary, time and frequency of spawning, age determination, rate of growth, age at maturity; concludes that spawning season October-March and more than one spawn per season; no maturity before 14 cm and two years of age.

Schultz, L. P.
1933. The age and growth of the *Atherinops affinis oregonia* Jordan and Snyder and other subspecies of bay smelt along the Pacific coast of the United States. Univ. Wash. Publ. Biol., vol. 2, no. 3, p. 45-102, 11 figs., 4 tbls., 2 pls.
Comparison of certain phases in life history based on 19,530 specimens from central Oregon to San Diego; age and growth, scale readings, sexual maturity, range, distribution, intergradation.

Clark, F. N. and G. H. Clark
1935. Size of bay smelt in the California commercial fishery. Calif. Fish and Game, vol. 21, no. 1, p. 86-87, 1 fig.
Effect of 1933 minimum length legislation on practical elimination of species from fishery; size compostion of catch, strain on supply; concludes that no valid reason existed for seven-and-a-half inch size limit law.

Aplin, J. A.
1949. Smelt. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 140-142, 1 fig.
Composition of market catch, effect on records of lumping together several species, methods and seasons of fisheries.

Carpelan, L. H.
1955. Tolerance of the San Francisco topsmelt, *Atherinops affinis affinis*, to conditions in salt-producing ponds bordering San Francisco Bay. Calif. Fish and Game, vol. 41, no. 4, p. 279-284, 1 fig.
Results of work accomplished at Hopkins Marine Station under Leslie Salt Company fellowship; sampling methods; spawning season, length, sexual maturity; mortality; influence of salinity, hydrogen ion concentration, temperature, dissolved oxygen; concludes that species most tolerant of any living in salt ponds.

CALIFORNIA BARRACUDA

Sphyraena argentea Girard

Lockington, W. N.
1879. Report upon the food fishes of California. Calif. Comm. Fisheries, Report for 1878 and 1879, p. 32.
Description and range; notes occurrence at least as far north as Tomales, but usually obtained south of San Francisco and at Farallones.

Lockington, W. N.
1880. Report upon the edible fishes of the Pacific coast, U.S.A., California. Calif. Comm. Fisheries, Report for 1880, p. 20, 48.
Abundance, methods of fishing, description and marketing procedures.

Eigenmann, C. H.
1892. The fishes of San Diego. U. S. Nat. Mus., Proc., vol. 15, p. 147-148.
Notes on year's observation at San Diego, January to December, 1890; methods of fishing, abundance, catch; notes bodily southward migrations during winter with strays remaining in local fishing grounds; concludes that species feeds chiefly on anchovy and that "amount of catch depends largely on the wind; a slack wind even when fish abundant brings few fish."

Smith, H. M.
1895. Notes on a reconnaissance of the fisheries of the Pacific coast of the United States in 1894. U. S. Fish. Comm., Bull., vol. 14, p. 230-231.
Study of the apparatus and methods of Pacific coast fishery with general remarks and specific descriptions; demand, market price, abundance; describes unusual 1893 incident: thousands of dead fish, mostly barracuda, washed ashore, many swimming around in a dazed condition, their heads out of water; gives most plausible explanation as unusually active eruption of submarine oil springs off coast leading to asphyxiation of fish by gills becoming coated with oil.

Smith, H. M.
1899. Report on the inquiry respecting food fishes and the fishing grounds. U. S. Comm. Fish and Fisheries, Report for 1898, p. CXL.
Work curtailed by transfer of *Albatross* to Navy Department in 1898, but evidence gathered indicating movements toward coast chiefly from deep water offshore and not north and south; recommends thorough examination of San Diego's outlying fishing grounds, habits, migrations, abundance, food, spawning.

Holder, C. F.
1903. Big game fishes of the United States. MacMillan Co., p. 99-104.
Personal observations and detailed description of methods used by Venetian and Portuguese fishermen of San Pedro; May or June inshore movement, schooling behavior as interference with yellowtail fishing; description, habitat, food, spawning areas.

Skogsberg, Tage
1925. Preliminary investigation of the purse seine industry of southern California. Calif. Comm. Fish and Game, Fish Bull. 9, p. 34-53.
Based on evidence gathered from personal observations during May and June, 1922, and on information provided by purse seine and gill net fishermen; habits and habitat; notes supposition of no southerly winter migration but movement to deeper water strongly supported by fact that purse seiners catch throughout winter; monthly landings 1916-1922; increase in importance of Mexican population; relative importance of differing fishing gear; recommends investigation of growth rate; entire biology; catch analysis of several consecutive years; notes lack of scientific proof bearing on overfishing problem and strong feeling of fishermen and fish dealers of need for protective measures to counteract damaging effects of highly developed fishing methods.

Barnhart, P. S.
1927. Pelagic fish eggs off La Jolla, California. Scripps Inst., Bull., Tech. Ser., vol. 1, no. 8, p. 91-92, 1 fig.

Brief account of 1926 constant weekly watch conducted by Scripps upon spawning condition of certain pelagic fish eggs; description of eggs and embryo collected by surface hauls among fishing boats working along edge of kelp beds.

Craig, J. A.
1927. Effects of the recent law prohibiting the taking of barracuda in California waters with purse seine or round haul nets. Calif. Fish and Game, vol. 13, no. 1, p. 18-25, 5 figs.

An attempt to answer questions of whether purse seine method kept market in unstable position and whether gill netters and gig boats contribute a more constant supply since their exclusive operation in fishery; variation in catch, prices, demand, fishing pressure; concludes that total catch diminished and monthly catch and average prices more variable; recommends that except for April through July purse seiners ought to be allowed to uprate in order to have more nearly equalized and stable catch and resultant list irregular price structure; also notes lack of information on species.

Walford, L. A.
1929a. Barracuda. *In* The commercial fish catch of California for the years 1926 and 1927. Calif. Div. Fish and Game, Fish Bull. 15, p. 38-41, 4 figs.

Largely a comparison of catch records by districts and explanation of differences; inference that fish caught farther north as season progresses.

Walford, L. A.
1929b. The spawning season of the California barracuda. Calif. Fish and Game, vol. 15, no. 2, p. 111-118, 6 figs.

Report on one phase of barracuda investigation begun by International Fisheries Commission constituting a daily two-year observation of 34,500 samples taken in San Pedro fresh fish markets; maturity, spawn, fluctuations in sex ratio during season.

Walford, L. A.
1932. The California barracuda. Calif. Div. Fish and Game, Fish Bull. 37, 120 p., 32 figs., 6 pls.

Two-part study presenting life history of California species and bibliography of world-wide species; determination, description and nature of spawning season; age determination and rate of growth, age composition of catch, evaluation of size limit protection, fishing seasons and methods; notes that south-north progression not a definite, clear-cut movement of fishery, but merely a trend; six plates showing annuli; appendix of daily spawning observations, average total lengths, time of annulus formation, frequency tables.

Walford, L. A.
1933. The life-history of the California barracuda and its bearing on the conservation of the fishery. Calif. Fish and Game, vol. 19, no. 1, p. 37-40, 2 figs.

Importance and distinction from voracious "man-eating" relatives, habits during season; notes sudden October disappearance either into deeper waters or southward migration; concludes that whatever direction of spring migration, evidently a spawning migration; discusses restrictive legislation and recommends increase of size limit slightly to 30 inches to protect all four-year-olds and part of five-year-olds in order to assure at least one good spawning season.

Whitehead, S. S.
1933. Condition of yellowtail fishery. Calif. Fish and Game, vol. 19, no. 3, p. 199-203, 2 figs.

Results of investigation in San Diego region to determine necessity of protective legislation; includes discussion of possible relationship between yellowtail and barracuda abundance; notes schooling together and catching simultaneously; description of fishing methods, analysis of barracuda catch.

Janssen, J. F., Jr.
1936. Barracuda. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 65-68, 3 figs.
Largely devoted to description of great fluctuation of yearly landings and reasons therefor; World War I impetus, value of species, importations, legislation, economic conditions, competition from other species, and possible decrease in supply; explanation of differences between California and Mexican-caught fish.

Wilson, R. C.
1949. Barracuda. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 91-93, 3 figs.
Brief description of importance to California commercial and sport fisheries; fishing methods, seasons, habitats, habits; notes apparently little relationship between average annual price paid fishermen and commercial catch in any one year; cites evidence of definite northward migration as fishery progresses indicating migratory nature of species.

Orton, G. L.
1955. Early developmental stages of the California barracuda, (*Sphyraena argentea* Girard). Calif. Fish and Game, vol. 41, no. 2, p. 167-176.
Description of samples taken by Scripps Institute collection regarding embryonic and pro-larval development; recommends need for more complete description of eggs in larval stages to permit accurate plankton samples.

CALIFORNIA YELLOWTAIL

Seriola dorsalis

Starks, E. C.

1918. The mackerel and mackerel-like fishes of California. Calif. Fish and Game, vol. 4, no. 3, p. 118-129, 12 figs.

Descriptive study with incidental mention of range, seasonal abundance, fisheries.

Skogsberg, Tage

1925. Preliminary investigation of the purse seine industry of Southern California. Calif. Div. Fish and Game, Fish Bull. 9, p. 63-72, 3 figs., 11 tbls.

Abundance, spawning, monthly landings, comparison between California and Mexican origin, relative importance of different gear; notes lack of scientific proofs on overfishing, discusses sudden and extraordinary 1919-1921 decrease but suggests no indication of natural supply depletion because pelagic fishery as large as yellowtail could not be depleted in so short a period; notes that fishermen and dealers corroborate facts of not fished to limit of capacity; contains tables on poundage landed monthly, amounts canned, development of fishery.

Whitehead, S. S.

1930. Yellowtail. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 52-53, 2 figs.

Development of fishery from small jig and live bait boats to 1920 introduction of purse seine; amounts canned, slight fluctuations; notes that another year needed to determine trend of catch.

Fry, D. H., Jr.

1931. Yellowtail. *In* The commercial fish catch of California for the year 1929. Calif. Div. Fish and Game, Fish Bull. 30, p. 44-48, 5 figs.

Annual landings 1916-1929 with explanation of peaks and drops; notes no restrictive legislation, no decrease in area available for fishing, no fish; catch figures and price paid leads to conclusion that fishery "apparently fished out."

Whitehead, S. S.

1933. Condition of yellowtail fishery. Calif. Fish and Game, vol. 19, no. 3, p. 199-203, 2 figs.

Results of investigation in San Diego region to determine necessity of protective legislation; detailed description of fishing methods, catch analysis; possible relationship between yellowtail and barracuda abundance; concludes that great decline in yellowtail catch due to population decrease and not to barracuda abundance increase; in need of protection, curtailment of fishing intensity.

Fry, D. H., Jr.

1937. Yellowtail. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 33-36, 2 figs.

Methods of fishing; comparison of total landings and local catch, sport catch increase, restrictive legislation; notes existence of "almost perfect evidence of exceedingly serious depletion" but that depletion not as serious as continued drop indicates.

Note: also appears in *California Conservationist*, vol. 3, no. 4, p. 22-23 (1938).

Greenhood, E. C.

1949. Yellowtail. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 146-148, 1 fig.

Review of restrictive legislation influencing catch; demand in price, demand by canners affecting poundage caught; notes that peak years of 1918, 1936 and 1947 belie any claim of depletion.

Collyer, R. D.
1954. Tagging experiments on the yellowtail, *Seriola dorsalis* (Gill). Calif. Fish and Game, vol. 40, no. 3, p. 295-312, 9 figs., 3 tbls.

Report of attempted solution to question of whether or not fish move from Mexican waters where abundant into California waters; full-scale investigation begun in January 1952 resulting from sportsmen apprehension over future good fishing; devoted mainly to development of suitable tags and marking at sea, with incidental mention of fish locality and recoveries; notes tubing and jaw tags as most successful; notes that of 3147 tagged, 103 recovered, of which only 13 moved more than ten miles; maximum movement of 240 miles.

Note: incorporates material relating to yellowtail in Young, P. H., J. W. Schott and R. D. Collyer (1953), The use of monofilament nylon for attaching Petersen disk fish tags. Calif. Fish and Game, vol. 39, no. 4, p. 445-462.

Baxter, J. L.
1958. Is another "fabulous" season ahead for yellowtail anglers? *Outdoor California*, vol. 19, no. 3, p. 12-13, 15, 6 figs.

Catch analysis of 1957 season, poundage, sport and commercial take, ocean temperatures, abundance, distribution, tag recoveries, migrations, growth, weight, spawning dates, fecundity, feeding habits.

PACIFIC JACK MACKEREL

Trachurus symmetricus

Starks, E. C.
1918. The mackerel and mackerel-like fishes of California. Calif. Fish and Game, vol. 4, no. 3, p. 118-129, 12 figs.
Descriptive study with incidental mention of range, seasonal abundance, fisheries.

Croker, R. S.
1929. Mackerel. *In* The commercial fish catch of California for the years 1926-1927. Calif. Div. Fish and Game, Fish Bull. 15, p. 42-43.
Notes confusion between horse, jack and Pacific mackerel; inclusion to 1925 catch records under mackerel classification; relative importance of each species.

Fry, D. H., Jr.
1930. Mackerel. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 25, footnote no. 1.
Notes horse mackerel as 8.5% average of mackerel catch for years prior to 1928; increased canning in 1928 leading to 66% increased catch.

Croker, R. S.
1933. The California mackerel fishery. Calif. Div. Fish and Game, Fish Bull. 40, p. 15-16, 38, 50-51, 134.
Los Angeles County landings, average yearly delivery, demand, periods of scarcity, methods of fishing, price.

Fry, D. H., Jr.
1937. Horse mackerel. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 22-23, 1 fig.
Range, incidental catch with Pacific mackerel; method of catch, fresh fish market demand, productive areas, yearly catch 1926-1935.

Roedel, P. M.
1949. Jack mackerel. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 31-33, 1 fig.
Official sanction of 1947 name change from horse to jack for marketing purposes with vast expansion of fishery; relationship to jack family, newcomer character to prominent cannery fishery; failure of sardine supply and poor 1947 Pacific mackerel season; landing fluctuations 1926-1947, abundance, productive areas, demand in price; notes unanswerable questions of size of reservoir, further expansion, limited local population.

Ahlstrom, E. H.
1952. Pilchard eggs and larvae and other fish larvae, Pacific coast, 1950. U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries no. 80, 58 p., 2 figs., 7 tbls.
First in series of reports recording quantitative sampling between Columbia River and Punto Abreojos, Lower California, extending 350 to 400 miles off-shore, designed primarily to yield information on sardine; information on other species partially incidental although not unexpected byproduct; tabulation of number of jack mackerel larvae taken.
Note: see tabulations in following in series for jack mackerel information:
U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries no. 102 (Ahlstrom 1953); no. 123 (Ahlstrom 1954); no. 155 (Ahlstrom and Kramer 1955); and no. 186 (Ahlstrom and Kramer 1956).

Roedel, P. M.
1953. The jack mackerel, *Trachurus symmetricus:* a review of the California fishery and of current biological knowledge. Calif. Fish and Game, vol. 3, no. 1, p. 45-68, 6 figs., 9 tbls.
Prosecution, gear, pack of fishery; impetus for 1947 emergence as major species, fishery, catch trends 1926-1951; regional gear use, monthly landings, seasons; price, fishing grounds, composition of catch; recounts biological studies and findings; notes serious gap in knowledge, no measure of fishing effort; concludes healthy condition of fishery; need for more research.

Clothier, C. R. and E. C. Greenhood
1956. Jack mackerel and sardine yield per area from California waters, 1946-1947 through 1954-1955. Calif. Dept. Fish and Game, Fish Bull. 102, p. 7-14, 7 figs.
Catch localities for six seasons with major and minor concentrations; close association with sardine fishery 1952-1953 and 1953-1954 seasons.

PACIFIC MACKEREL

Pneumatophorus diego

Starks, E. C.
1918. The mackerel and mackerel-like fishes of California. Calif. Fish and Game, vol. 4, no. 3, p. 118-129, 12 figs.
Descriptive study with incidental mention of range, seasonal abundance, fisheries.

Croker, R. S.
1929. Mackerel. *In* The commercial fish catch of California for the years 1926-1927. Calif. Div. Fish and Game, Fish Bull. 15, p. 42-45, 5 figs.
Abundance, untapped Southern California supplying distribution; notes that before 1925 Pacific and horse both included in catch records under mackerel; relative importance, demand, market conditions, fishing methods, canning increased activity; notes that "1929 marks opening vast new field."

Fry, D. H., Jr.
1930. Mackerel. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 25-35, 8 figs.
Historical development of canning industry, volume, market demand by geographical area; abundancy by state district; development of gear and catch handlings; notes tremendous growth of young industry; questions supply ability to withstand strain.

Fry, D. H., Jr.
1931. Mackerel. *In The* commercial fish catch of California for the year 1929. Calif. Div. Fish and Game, Fish Bull. 30, p. 35-37, 3 figs.
Notes sky-rocketing 1929 catch of 58,000,000 pounds and reasons for 1930 drop; general depression effect on new industry in comparison with established salmon and sardines.

Croker, R. S.
1933. The California mackerel fishery. Calif. Div. Fish and Game, Fish Bull. 40, 149 p., 73 figs.
Extremely detailed historical account divided by regions; extent, price, seasons, methods, boats, gear, handling, packing, marketing, sport fishing, mackerel fisheries of the world; includes comprehensive account of three species of marine fishes bearing name "Mackerel," with some modifying adjective such as Pacific, Spanish and horse.
Note: see Croker (1937) for continuation.

Fry, D. H., Jr.
1933. Mackerel eggs taken off Southern California coast. Calif. Fish and Game, vol. 19, no. 4, p. 288.
Discovery of eggs taken in tow hauls by patrol boat *Bluefin* in Santa Monica Bay; water temperature and depth, bottom description.

California Conservationist.
1936. Mackerel catch is new Pacific coast record. Vol. 1, no. 3, p. 1-20.
Devoted to remarks of D. H. Fry, Jr. on necessity for restricted measures in light of increased catches and advance canners orders.

Fry, D. H., Jr.
1936a. A description of the eggs and larvae of the Pacific mackerel. Calif. Fish and Game, vol. 22, no. 1, p. 27-29.
Stripping and artificial fertilization methods; pigmentation.

Fry, D. H., Jr.
1936b. A preliminary summary of the life history of the Pacific mackerel. Calif. Fish and Fame, vol. 22, no. 1, p. 30-39, 5 figs.
Progress report of work undertaken to determine possibility of overfishing and to learn about species to provide suitable protective measures if necessary; abundance, distribution, spawning season and areas, nursing grounds, growth rate, length-weight relationship, size composition of catch, food, migration; emphasizes preliminary nature of findings.

Croker, R. S.
1937. Historical account of the Los Angeles mackerel fishery. Calif. Div. Fish and Game, Fish Bull. 52, 62 p., 37 figs, 8 tbls.
Sequel to Croker (1933) tracing development and changing character of fishery in interval; proportion of total catch by different boat types such as lampara, seine, gill net, set line, skiff, striker, pleasure; demonstration of highly seasonal nature of fishery, violent fluctuations and reasons therefore; availability, weather, market conditions, plant capacity, labor strikes, competition of other fisheries.

Fry, D. H., Jr.
1937a. Pacific mackerel. *In* The commercial fish catch of California the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 18-22, 3 figs.
Fishing methods, gear, boat numbers and types, use of seines, strikers, night fishing; importance to Los Angeles fishery.
Note: popular presentation appears in *California Conservationist*, vol. 2, no. 12 (1937), p. 1-6.

Fry, D. H., Jr.
1937b. Tagging Pacific mackerel. Calif. Fish and Game, vol. 23, no. 2, p. 125-131, 2 figs.
See Fry and Roedel (1939) for incorporation and expansion of material.

Fry, D. H., Jr.
1937c. The changing abundance of the Pacific mackerel, a preliminary boat catch study. Calif. Fish and Game, vol. 23, no. 4, p. 296-306, 4 figs.
Changing abundance, number of boats and type of gear; demand; boat catch curve 1933-1937; concludes that fishing intensity and catch trend lead to every reason for fishery collapse; recommends restrictive measures to allow population buildup.
Note: see Fry and Roedel (1949).

California Conservationist
1938. Mackerel industry sets up voluntary closed season. Vol. 3, no. 4, p. 17.
Fishermen, canners, Bureau agree; scarcity of fish caused by heavy fishing; in absence of legislation (none effective until fall, 1939) voluntarily established closed season; "exhibits spirit of cooperation and admission that mackerel need protection."

Boone, A. R.
1939. Tags on 75,000 fish. *California Magazine of the Pacific*, vol. 29, no. 5, p. 18-19, 30.
Popular article recounting tagging experiment relative to tuna, mackerel and sardine; extraction of material in scientific papers.

Fry, D. H., Jr., and P. M. Roedel
1939. Progress report on tagging Pacific mackerel. Calif. Fish and Game, vol. 25, no. 1, p. 2-17, 15 figs., 1 tbl.
Continuation of program initiated July, 1935, to determine extent of California and Mexican populations and extent of migrations; range, areas of heavy fishing, known spawning areas; type of tag used, methods, number and locale of tagged and recovered specimens; fish movements, maximum rate; results of 412 recoveries of 16,848 tagged specimens indicate interchange between Monterey and Southern California and mingling from different parts of Southern California area, but Lower California returns too scattered.
Note: incorporation and expansion of material presented in Fry (1937b); condensation appears in *California Conservationist*, vol. 4, no. 3, (1939), p. 3-5; see Fry and Roedel (1949).

Fry, D. H., Jr.
1941. Mackerel tagged in Lower California in fall and winter of 1939-1940. Calif. Fish and Game, vol. 27, no. 1, p. 31-33, 1 fig.
Summary of tagging and recovery operations.
Note: see Fry and Roedel (1949).

Roedel, P. M.
1948. Pacific mackerel in Gulf of California. *Copeia*, no. 3, p. 224.
Account of collections made on cruises of *N. B. Scofield* well within Gulf, demonstrating fairly abundant in excess of previously recorded range.

Fry, D. H., Jr. and P. M. Roedel
1949. Tagging experiment of the Pacific mackerel. Calif. Div. Fish and Game, Fish Bull. 73, 64 p., 15 figs., 21 tbls.
Summarizes pertinent data of three previous progress reports (Fry, 1937c and 1941, and Fry and Roedel, 1939) ; presents mainly techniques, experiments, mortality methods and correction factors of tagging program; means of recovery; concludes that Pacific northwest and central area fish move south to Los Angeles area in magnitude; substantial northerly movement from Southern California and Lower California; rate of exploitation "remarkably low in relation to the total rate of decline"; use of tag returns as abundance measures inaccurate and dubious.
Note: reprinted in *Pan-American Fisherman*, vol. 4, July, 1949.

Roedel, P. M.
1949a. Notes on the spawning grounds and early life history of the Pacific mackerel. Calif. Fish and Game, vol. 35, no. 3, p. 147-153, 10 figs.
Presentation of data obtained since 1936 and results of 1936-1941 extensive surveys in California and Mexican waters; description of eggs and larval development accompanied by drawings.

Roedel, P. M.
1949b. Pacific mackerel. *In* The commerial fish catch of California for the year 1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 33-37, 1 fig.
Discussion of accuracy of landing catch figures relative to mixed fish inasmuch as early records included jack mackerel; notes that frequently netted with sardines and entire load entered as "sardines"; periods of scarcity in seasons leading to 1938-1940 canners' agreement to voluntary closed season in April and May; extent of fishing grounds, methods of fishing; notes 1947 as worst season.

Fitch, J. E.
1951. Age composition of Southern California catch of Pacific mackerel, 1938 through 1940, 1950 through 1951. Calif. Dept. Fish and Game, Fish Bull. 83, 73 p., 17 figs., 19 tbls.
Historical review of sampling; general discussion of age determination; reliability, materials and methods; notes that decline in abundance marked by increase in jack mackerel landings; concludes that future of fishery "not a bright one"; dependence on fish less than four years old; recommends closed season, yearly bag limits, minimum size restrictions.
Note: see Fitch (1953a, 1953b).

Fitch, J. E.
1952. The decline of the Pacific mackerel fishery. Calif. Fish and Game, vol. 38, no. 3, p. 381-389, 1 fig., 3 tbls.
Records constantly increased fishing pressure; gear, number of boats, equipment and devices; concludes that reserve stock of mature spawning fish to take care of future needs not now a possibility; need for drastic action relative to closed season and size limits.

Roedel, P. M.
1952a. A racial study of the Pacific mackerel. Calif. Dept. Fish and Game, Fish Bull. 84, 53 p., 5 figs., 7 tbls., appendix.
Results of population study to compliment tagging experiments; sampling of 2,577 specimens in geographical regions, methods; morphometric differences in different geographical localities; notes that conclusions not compatible with tagging experiments and that fact of no movements contradicts population studies in part; concludes that Pacific coast population extremely heterogeneous, no evidence of intra-regional variation.

Roedel, P. M.
1952b. A review of the Pacific mackerel fishery of the Los Angeles region with specific reference to the years 1939 through 1951. Calif. Fish and Game, vol. 38, no. 2, p. 253-273, 7 figs., 8 tbls.
Fishing ports, methods, seasons, grounds, price; within season trends; changes in grounds and extension.

Fitch, J. E.
1953a. Age composition of the Southern California catch of Pacific mackerel for the 1951-52 season. Calif. Fish and Game, vol. 39, no. 1, p. 141-146, 4 tbls.
Second report in series; length frequency at each age, catch composition.
Note: see Fitch (1951).

Fitch, J. E.
1953b. Age composition of the Southern California catch for Pacific mackerel for the 1952-53 season. Calif. Fish and Game, vol. 39, no. 4, p. 553-558, 1 tbl.
Third report in series; frequency by age groups, length, age.
Note: see Fitch (1951, 1952 and 1953).

Walker, B. W.
1953. New records of Pacific sardine and Pacific mackerel in the Gulf of California. Calif. Fish and Game, vol. 39, no. 2, p. 263-264.
Report of single specimen taken on eastern side of Gulf; notes need for study of distribution and relationship of species of coast area.

Roedel, P. M. and D. C. Joseph
1954. The Pacific mackerel fishery in the 1951-1952 and 1952-1953 season. Calif. Fish and Game, vol. 40, no. 1, p. 55-59, 5 tbls.
Brings Los Angeles catch records up to date; notes virtual disappearance of scoop fishery and resultant catch decline to lowest level since depression years; no evidence of good spawning recently.

Fitch, J. E.
1955. Age composition of the Southern California catch of Pacific mackerel for the 1953-54 season. Calif. Fish and Game, vol. 41, no. 1, p. 107-112, 4 tbls.
Fourth report in series, covering seasonal landings of 7,613,000 pounds, lowest since specie's first prominence as cannery item in 1928; length frequency, age composition.

Fitch, J. E.
1956. Age composition of the Southern California catch of Pacific mackerel for the 1954-55 season. Calif. Fish and Game, vol. 42, no. 2, p. 143-148, 5 tbls.
Fifth report in series; length, age determination, estimation of numbers, catch records.

CALIFORNIA BONITO

Sarda lineolata

Walford, L. A.
1936. The bonitos of the Pacific ocean. Santa Barbara Mus. Nat. Hist., Occasional Papers no. 4, p. 8-10.
Characteristics of species; separation of *S. lineolata* from *S. chilensis*.

Godsil, H. C.
1937. Bonito. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 31, 2 figs.
Landings, demand, distribution confined to coastal shelf.

Godsil, H. C.
1949. The bonito. *In* The commercial fish catch of California for the year 1947, with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 93-96, 1 fig., 1 tbl.
Distribution habits, suggestions of seasonal migration; methods of fishing, limited market, processing; fluctuations possibly due to availability relative to that of more desirable and marketable fish; notes that condition of fishery not apparent but that conditions underlying exploitation safeguard its immediate future.

Godsil, H. C.
1954. A descriptive study of certain tuna-like fishes. Calif. Dept. Fish and Game, Fish Bull. 97, 185 p., 93 figs., 17 tbls.
Technical description of fishes and evaluation of relationships in answer to practical and important problem of standards of identity for industry use; results of study undertaken at request for definition to eliminate arbitrary inclusions or exclusions of particular species from packing of tuna; supplies facts upon which sound definition can be based; California bonito, p. 30-43; Mexican bonito, p. 44-59.

Godsil, H. C.
1955. A description of two species of bonito and a consideration of relationships within the genus. Calif. Dept. Fish and Game, Fish Bull. 99, 43 p., 14 figs., 8 tbls.
Final portion of descriptive series undertaken in attempt to gain knowledge of composition of total stock and geographic range of component species; descriptions of Peruvian and Oriental species.

TUNAS

There are five species included in the tuna catch of California. Four of these—albacore, bluefin, skipjack and yellowfin—are packed and marked as tuna, but the fifth cannot be so labeled and appears on the grocer's shelf as "bonito." For this reason, the bonito is discussed as a separate article from the tunas in general.

Pacific albacore *Thunnus germo*
California bluefin tuna *Thunnus saliens*
Pacific yellowfin tuna *Neothunnus macropterus*
Skipjack *Katsuwonus pelamis*

Thompson, W. F.
1917. Temperature and the albacore. Calif. Fish and Game, vol. 3, no. 4, p. 153-159, 3 figs.
Progress report on one phase of albacore research; clear cut relationship of temperature with catch; fishing methods, abundance, "runs," fluctuations.

Starks, E. C.
1918. The mackerel and mackerel-like fishes of California. Calif. Fish and Game, vol. 4, no. 3, p. 118-129, 12 figs.
Descriptive study with incidental mention of range, seasonal abundance, fisheries.

Kishinouye, Kamakichi
1923. Contributions to the comparative study of the so-called scombroid fishes. Imperial Univ. Tokyo, Coll. Agric., Journal, vol. 8, no. 3, p. 293-475, 26 figs., 22 tbls.
Comprehensive work on systematics of the Pacific tuna; comparative anatomy, biology and ecology, classification.

Skogsberg, Tage
1925. Bluefin tuna. *In* Preliminary investigation of the purse seine industry of Southern California. Calif. Div. Fish and Game, Fish Bull. 9, p. 72-74, 2 tbls.
Occurrence, seasons, schooling behavior, spawning between December and May when absent from California waters; distribution of catch, gear used; notes no available scientific proof of overfishing; concludes that sudden decline due to relatively low prices, great variation in behavior probably correlated with unfavorable hydrological conditions.

Jordan, D. S. and B. W. Evermann
1926. A review of the giant mackerel-like fishes, tunnies, spearfishes and swordfish. Calif. Acad. Sci., Occ. Papers no. 12, p. 7-29.
Description and comparison of additions to Kishinouye of species from Hawaii, Japan, New Zealand and California.

Whitehead, S. S.
1929. Tuna seasons. *In* The commercial fish catch of California for the years 1926 and 1927. Calif. Div. Fish and Game, Fish Bull. 15, p. 48, 2 figs.
Months of catch at different localities; areas of fishing from Point Conception to Socorro Islands.

Conner, Geraldine
1930. The five tunas. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 75-89, 9 figs.
History of the industry; demand, extension of grounds, importations, points of origin, seasons, monthly and yearly average catch.

Corwin, Genevieve
1930. A bibliography of the tunas. Calif. Div. Fish and Game, Fish Bull. 22, 103 p.
Compilation of materials on world-wide basis; items pertinent to current bibliography extracted and listed herein.

Whitehead, S. S.
1930. California bluefin tuna. Calif. Fish and Game, vol. 16, no. 3, p. 231-233, 4 figs.
Devoted mainly to industry, canning and catch.

Phillips, J. B.
1931. Albacore at Monterey. Calif. Fish and Game, vol. 17, no. 1, p. 85.
Comments on 1930 run; types of boat, price, locality of catch; Monterey and Santa Cruz landings 1920 to 1930; relationship of warm ocean currents to northward extension of range.

Whitehead, S. S.
1931. Fishing methods for the bluefin tuna and an analysis of the catches. Calif. Div. Fish and Game, Fish Bull. 33, 32 p., 22 figs.
Descriptive treatment of gear and methods of industry with incidental mention of localities fished, fish behavior, season and time of day captured; statistical treatment of total and average yearly catch; average boat monthly catch; concludes that numbers of fish sufficient to support fishery and that no protective legislation needed.

Godsil, H. C.
1935. Locality records and the tuna fishery. *In* The commercial fish catch of California for the years 1930-1934, inclusive. Calif. Div. Fish and Game, Fish Bull. 44, p. 41-43, 1 fig.
Notes shortcomings in statistical system relative to skipjack and yellowfin because entire catch taken in foreign or international waters; contributory factors of defects and attempts to remedy unreliable and incomplete locality records.

Godsil, H. C.
1937. The five tunas. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 24-33, 9 figs.
Annual landings absorbed by canning industry; sections dealing with each local species; area, methods, seasons, gear, relative importance of each fishery; biological, hydrological and economical factors affecting catch.
Note: also appears in *Calif. Conservationist*, vol. 2, no. 6, p. 3-7.

Godsil, H. C.
1938a. The high seas tuna fishery of California. Calif. Div. Fish and Game, Fish Bull. 51, 41 p., 20 figs.
Limited to a description of yellowfin and skipjack fishery, boats, gear and methods with incidental mention of size, grounds, habits and symbiotic relationship with porpoise.

Godsil, H. C.
1938b. Tuna tagging. Calif. Fish and Game, vol. 24, no. 3, p. 245-250, 1 fig.
Devoted to methods and operation of program to determine nature of stock; type of tag used, number of fish tagged.

Hart, J. L.
1942. Albacore food. *In* Canada Fish. Res. Bd., Prog. Rept. no. 52, p. 9-10, 1 fig.
Partial results of study to determine species diet and provide fishermen with information useful in devising lures in light of need for local lures on account of import cut off by war; notes that albacore will strike at almost anything with preferences dictated by prevalence of euphausiids.

Brock, V. E.
1943. Contribution to the biology of the albacore of the Oregon coast and other parts of the northern Pacific. Stanford Ichth. Bull., vol. 2, p. 199-248, 19 figs., 18 tbls.
Results of first four years of Oregon inquiry into stability of intensive fishery beginning in 1937; fishery, gear and methods; discussion pertaining to California and Oregon on fish habits, occurrence, length frequency distribution, relative abundance of modal groups, sexual differences, seasonal changes in size, and growth rate; concludes that two or three dominant year classes in exploited populations; probably that fish taken are immature and have never spawned, accounting for instability of fishery; intermingling; possible wholesale migration.

Godsil, H. C.
1944. A systematic study of the Pacific tunas. Calif. Div. Fish and Game, Fish Bull. 60, 131 p., 76 figs., 11 tbls.
Results of research trips of *N. B. Scofield* to all parts of extensive local fishing grounds to undertake a morphological study to determine

geographical range of species and relationships between them and similar ones occurring in the central western and equatorial Pacific; detailed anatomical treatment, comparative anatomy of albacore, bluefin, bigeye, skipjack and yellowfin; concludes that skipjack *K. pelamis* a species throughout fishery; yellowfin *Neothunnus macropterus* a single species throughout fishery; albacore *T. germo* a single species with geogrophical distribution extending across the north temperate Pacific; bluefin *T. thynnus* tentatively one species.

Note: see Godsil 1948 and Godsil and Greenhood 1951 for continuation of investigation.

Godsil, H. C.

1945. The Pacific tunas. Calif. Fish and Game, vol. 31, no. 4, p. 185-194, 7 figs. Anatomical study with key to identification.

Hart, J. L. and H. J. Hollister

1947. Notes on the albacore fishery. Canada Fish. Res. Bd., Prog. Rept. no. 71, p. 3-4.

Deals with logbook records on position, water temperature and catch, in addition to stomach analysis.

Godsil, H. C.

1948. A preliminary population study of the yellowfin tuna and the albacore. Calif. Div. Fish and Game, Fish Bull. 70, 90 p., 22 figs., 7 tbls., App. A-E.

Continuation of study of relationship of Japanese and Hawaiian albacore and yellowfin to local specimens to determine whether yellowfin in eastern Pacific constitute a single homogeneous and intermingling population or an aggregate of separate and recognizable groups each confined to a specific geographic area, and to determine whether local industry and Hawaiian and Japanese fisheries share a common reservoir: measurements in straight line distances recorded in millimeters; extent of fishing grounds, statistical analysis, graphs and measures of divergence; concludes that albacore of Japanese fishery probably distinct, and that California fleet exploiting single, intermingling population of yellowfin, with separate and distinct Japanese and Hawaiian population; therefore, yellowfin stock exploited by California fleet in eastern Pacific between Southern California and the Equator does not receive external recruitment.

See Godsil and Greenhood, 1951.

Hart, J. L. and others

1948. Accumulated data on albacore (*T. alalunga*). Canada Fish. Res. Bd., Circ. 12, 11 p., tbls. Mimeographed.

Collection bearing on increasing the efficiency and consistency of fishing; food, sizes landed in British Columbia, log book records denoting most productive areas and temperatures.

Oregon Fish Commission

1948. Albacore have higher temperatures than surrounding water. Res. Briefs, vol. 1, no. 1, p. 12.

Records body temperature of nine albacore off Oregon coast taken in August 1947, ranging between 80° and 86°, water at 63°; notes feeding largely on anchovies.

Schaefer, M. B.

1948. Morphometric characteristics and relative growth of yellowfin tunas from central America. *Pacific Science*, vol. 2, no. 2, p. 114-119, 2 tbls.

Discussion of taxonomic and economic problems of genetic differences between yellowfin tuna stocks inhabiting different parts of Pacific; classification based on variations in dorsal and anal fin growth of specimens taken between January and June 1947, off Costa Rican waters; characteristics, relative growth, length-weight relationship.

Schaefer, M. B. and J. C. Marr

1948. Contributions to the biology of the Pacific tuna. U. S. Fish and Wildlife Ser., Fish. Bull. 44, vol. 51, p. 187-206.

Results of a preliminary study in Costa Rican waters, January to May 1947; size composition of samples, gonad examination, manner of

aggregation in schools, rate of growth; notes that scattered observations of sexually mature and spent individuals and capture of juveniles offer no conclusions regarding the geographical concentration or extent of occurrence of juveniles; indicates area off Costa Rica and northern Panama as only definite known spawning area of yellowfin and skipjack in eastern Pacific.

Note: one section devoted to North Marshall Islands' observation, March through August 1946, July through August 1947, and probable spawning region in vicinity of Bikini, Rongerik and Rongerlap Atolls.

Godsil, H. C.

1949. The tunas. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 11-27, 6 figs., 4 tbls.

Growth of industry; total annual landings plus importations, annual catch of constituent species in pounds and percentages; discussion of industry by species, habits, distribution, occurrence in areas, fishing gear and methods; expansion of fleet; predicts that "1948 on threshold of expansion and immediate future promises a new epoch."

Heckles, H. H.

1949. Observations on juvenile oceanic skipjack from Hawaiian waters and Sierra mackerel from the eastern Pacific. U. S. Fish and Wildlife Ser., Fish. Bull. 48, vol. 51, p. 245-250, 3 figs.

Description of specimens collected during exploratory tuna fishing between January and October 1948; discovery of juveniles indicates possible Hawaiian spawning area.

Godsil, H. C. and E. K. Holmberg

1950. A comparison of the bluefin tunas, *genus Thunnus*, from New England, Australia and California. Calif. Div. Fish and Game, Fish Bull. 77, 55 p., 15 figs., 4 tbls., Appendix.

A study to clarify anatomical differences and systematic relationships based largely on examination of variable external and internal characteristics to determine whether positive diagnostic differences exist; concludes that Australian bluefin entirely distinct from remaining genus members; California coast bluefin remarkably similar to Atlantic specimens; striking similarity between *T. thynnus* of California coast and *T. orientalus* of Japan, but until further investigation, considered separate; no present change in nomenclature recommended.

Schaefer, M. B. and L. A. Walford

1950. Biometric comparison between yellowfin tunas of Angola and the Pacific coast of central America. U. S. Fish and Wildlife Ser., Fish. Bull. 56, vol. 51, p. 425-443, 15 figs.

A contribution to the solution of tuna speciation problems; detailed comparison of morphometric characters of freshly caught yellowfins examined in canneries in Portuguese West Africa and in Costa Rica; relative growth of Atlantic specimens, computation of linear mean square regression, comparison with Pacific and data in literature; notes a marked difference in rate of growth of certain fins and body dimensions and that two populations separate and distinct; recommends Atlantic form called *Neothynnus albacora* and Pacific form *Neothynnus macropterus*.

Godsil, H. C. and E. C. Greenhood

1951. A comparison of the populations of yellowfin tuna from the east and central Pacific. Calif. Dept. Fish and Game, Fish Bull. 82, 33 p., 6 figs., 7 tbls., Appendix.

Continuation of study reported in Godsil (1948) with data from more specimens furnishing opportunity to check tentative conclusions; statistical methods of variance analysis supplemented by objective comparison of regression lines; comparison of stock specimens, effects of freezing and shrinkage on physical condition; notes that results confirm earlier findings.

Mead, G. W.
1951. Post larval *Neothunnus macropterus, Auxis thazard* and *Euthunnus lineatus* from the Pacific coast of Central America. U. S. Fish and Wildlife Ser., Fish. Bull. 63, vol. 52, p. 121-127, 5 figs., 2 tbls.
Description of identifying characteristics of juveniles based on May 1949 collection on west coast of Nicaragua and El Salvador, supplemented by California Academy of Sciences 1932 collection; observation on adults and young; key to post larvae; concludes that spawning season apparently long and area large, probably throughout Central American tropical waters.

Moore, H. L.
1951. Estimation of age and growth of the yellowfin tuna in Hawaiian waters by size frequencies. U. S. Fish and Wildlife Ser., Fish. Bull. 55, vol. 52, p. 133-145, 14 figs., 3 tbls.
Description of long-line and live bait fishery; weight and length frequency analysis, growth curves, age groups derived from 4793 specimens obtained at Hawaiian fish auctions and canneries; concludes that Hawaiian yellowfin rapid growing, at least sixty pounds in one calendar year in part of life; results in general disagree with some studies of other tunas and with comparable yellowfin studies.

Schaefer, M. B.
1951. Some recent advances in the study of the biology and racial distinction of Pacific tuna. Indo-Pacific Fisheries Council, Proc., 2nd meeting, Sec. 2 and 3, p. 63-69, 3 figs.
Brief summary of published work with reference to age and growth, spawning habits.
Note: all material pertinent to current bibliography referenced herein.

Shimada, B. M.
1951a. Contributions to the biology of tunas from the western equatorial Pacific. U. S. Fish and Wildlife Ser., Fish. Bull. 62, vol. 52, p. 111-119, 2 figs., 4 tbls.
Observations of various biological studies conducted aboard Japanese tuna mother ships operating in water south of Caroline Islands during summer 1950; spawning grounds, distribution records of juveniles; data suggests existence of spawning grounds in or near region fished.

Shimada, B. M.
1951b. Juvenile oceanic skipjack from the Phoenix Islands. U. S. Fish and Wildlife Ser., Fish. Bull. 64, vol. 52, p. 129-131, 1 tbl.
Records characteristics of specimens captured incidentally to biological, oceanographical and exploratory fishing studies conducted in south central Pacific by POFI during summer 1950; notes definite evidence of spawn in that area.

Shimada, B. M.
1951c. An annotated bibliography on the biology of the Pacific tunas. U. S. Fish and Wildlife Ser., Fish. Bull. 58, vol. 52, 58 p.
All materials pertinent to current bibliography referenced herein.

Godsil, H. C. and E. C. Greenhood
1952. Observations on the occurrence of tunas in the eastern and central Pacific. Calif. Fish and Game, vol. 38, no. 2, p. 239-249, 2 figs., 1 tbl.
Report of 1948 9000-mile, eight-week trip of *N. B. Scofield;* distribution, abundance, habitat, area of catch of albacore, skipjack and yellowfin; relation to working birds; suggests on- and offshore movement in season and possible extension of season in regions described.

Greenhood, E. C.
1952. Results of the examination of four small yellowfin tuna, *Neothunnus macropterus.* Calif. Fish and Game, vol. 38, no. 2, p. 157-161, 1 fig., 3 tbls.
Morphometric details of three specimens taken by *N. B. Scofield* in Hawaiian waters and one from Costa Rican waters; significance of difference compared with larger sized individuals.

McHugh, J. L.
1952. The food of the albacore off California and Baja California. Scripps Inst. Bull., vol. 6, no. 4, p. 161-172, 4 figs.

Examination of 321 stomachs of specimens caught by cooperative sardine program; food organisms, latitudinal annual and seasonal variations; wide variety of food noted; notes possible relationship between albacore migration and saury abundance.

Powell, D. E., D. L. Alverson and R. Livingston, Jr.

1952. North Pacific albacore and tuna investigation—1950. U. S. Fish and Wildlife Ser., Fish. Leaflet 402, 56 p., 43 figs., 7 tbls.

Continuation of Leaflets 376 and 385; progress report presentation of exploratory fishing and gear testing experiments in Oregon, Washington, British Columbia and Alaska offshore waters June to September 1950, to obtain inshore migration pattern information, test various types of gear, record environmental condition, possibility of establishing Alaska coast fishery. Description of gear, albacore, occurrence, migration patterns, size, food, water temperature; historical summary of Oregon and Washington fishery; notes best fishing in 58°-60° blue waters, food preference for small rockfish, saury and squid; notes incidental discovery of uncharted sea mount 270 miles west of Willaga Bay, Washington, with bird and sea life indicating favorable feeding area for pelagic fishes.

Schaefer, M. B.

1952. Comparison of yellowfin tuna of Hawaiian waters and of the American west coast. U. S. Fish and Wildlife Ser., Fish Bull. 72, vol. 52, p. 353-373, 11 figs., 7 tbls.

Report written to settle question of racial distinctness of two populations based on specimens from commercial fishing vessels from February to September 1949; regression equations, relative growth of Hawaiian yellowfin, comparison of fin, head and total length and other dimensions, and gill raker counts; concludes that populations distinct, based on magnitude and consistence of biometric characterstic differences; notes implications to industry that west coast fishery not tapping entire yellowfin resource of Pacific, but an essentially virgin resource.

Ganssle, David and H. B. Clemens

1953. California-tagged albacore recovered off Japan. Calif. Fish and Game, vol. 39, no. 4, p. 443.

Notes first authentic evidence of transpacific migration with recovery by Japanese fisherman of specimen tagged near Los Angeles Harbor; notes distance as 4900 miles, days out as 324.

June, F. C.

1953. Spawning of yellowfin tuna in Hawaiian waters. U. S. Fish and Wildlife Ser., Fish. Bull. 77, vol. 54, p. 47-64, 11 figs., 6 tbls.

Ova descriptions, ovary development, number of ova, and spawning season based on specimens collected at auctions from commercial long-line fishery; concludes that number of ova increases with fish size; spawn in Hawaiian waters coincidental with best long line catch.

Murphy, G. I. and R. S. Shomura

1953. Long line fishing for deep-swimming tunas in the central Pacific, 1950-51. U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries 98, 47 p., illus.

Results of Pacific Oceanic Fishery Investigations of tuna resources of central Pacific; long line operations as sampling tool, suggested changes for greater efficiency; yellowfin biology, abundance, distribution; zooplankton abundance.

Note: continuation of series to be found in following U. S. Fish and Wildlife Ser., Spec. Sci. Repts., Fisheries: no. 108, Murphy and Shomura (1953); no. 119, Murphy and Elliott (1954); no. 137, Murphy and Shomura (1955); no. 157, Shomura and Murphy (1955).

Pacific Fisherman

1953. California tagged albacore caught by Japanese. Vol. 51, no. 9, p. 11.

Notes June 1953 recovery southeast of Tokyo of specimen tagged August 1952 by California Department of Fish and Game; first direct evidence of albacore migration from Pacific north American waters to Japanese waters.

Reintjes, J. W. and J. E. King

1953. Food of yellowfin tuna in central Pacific. U. S. Fish and Wildlife Ser., Fish. Bull. 81, vol. 54, p. 92-110, 10 figs., 6 tbls.

Quantitative analysis of 1097 stomach contents taken in waters of Line and Phoenix islands; identification and evaluation of contents, size of organisms, gorging, diurnal variation, relation of volume of stomach content to oceanographic conditions; concludes that great variety accepted, from squid to plankton; composition varied considerably with size and locale of capture; distribution probably not determined by occurrence of specific items but by total amount of organisms present in area.

Blunt, C. E., Jr.

1954. Two mid-Pacific recoveries of California-tagged albacore. Calif. Fish and Game, vol. 40, no. 3, p. 339.

Records recoveries in Midway Island vicinity of specimens tagged near Guadalupe Island; type of tag, length increase, distance traveled as 3035 miles.

Clemens, H. B.

1955a. Catch localities for Pacific albacore landed in California, 1951 through 1953. Calif. Dept. Fish and Game, Fish Bull. 100, 28 p., 24 figs., 3 tbls.

Results of one line of albacore life history investigation; summarization of available data delineating area exploited by California fleet; fishery, vessels, methods, abundance, season, most productive areas, detailed tonnages by one degree square of ocean by month of catch; concludes that as season progresses, fishery moves northward and offshore.

Clemens, H. B.

1955b. Pacific albacore fishery moves offshore. *National Fisherman*, vol. 36, no. 9, p. 17, 34, 1 fig.

Report of catches made outside of 150 miles and migration north as season progresses; occurrence, quantity taken in areas, vessel description, methods of fishing, economic factors, schooling behavior.

Juhl, Rolf

1955. Notes on the feeding habits of subsurface yellowfin and bigeye tunas of the eastern tropical Pacific ocean. Calif. Fish and Game, vol. 41, no. 1, p. 99-101, 1 tbl.

Summary of fifteen stomach content analyses of specimens taken on cruise reported in Wilson and Shimada (1955); methods and materials, details of analyses, length, place of capture; notes inconclusive nature of data; contents consisted predominantly of fish, squid, swimming crabs; probably seasonal variation in foods.

Murphy, G. I. and I. I. Ikehara

1955. A summary of sightings of fish schools and bird flocks and of trolling in central Pacific. U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries 154, 32 p., illus.

Catch rate variation, average depth by deepest hooks, catch composition; notes average male to female ratio in catch as 2.26:1.00; indications of tuna abandoning island habitat for open sea and changing mode of life from surface to deep-swimming.

Wilson, R. C. and B. M. Shimada

1955. Tuna longlining: results of a cruise to the eastern tropical Pacific ocean. Calif. Fish and Game, vol. 41, no. 1, p. 91-98, 3 figs., 2 tbls.

Summary of January-March 1953 biological findings to determine existence of deep-living stocks; methods and operation of *N. B. Scofield;* length frequencies, weight, plankton volumes; concludes that large tunas inhabit sub-surface depths in area surveyed; distribution influenced by oceanic circulation rather than by land masses; no apparent correlation between plankton abundance and longline fishing success.

See Juhl (1955) for another phase of investigation.

See Murphy and Shomura (1953) for conclusions relative to meaningful relationship between tuna abundance and zooplankton abundance in equatorial central Pacific area.

Clemens, H. B.

1956. Rearing larval scombrid fishes in shipboard aquaria. Calif. Fish and Game, vol. 42, no. 1, p. 69-79, 2 figs., 2 tbls.

Specimens obtained on cruise of *N. B. Scofield;* description of techniques; collection methods; growth, schooling and swimming observations.

Iverson, E. S.
1956. Size variation of central and north Pacific yellowfin tuna. U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries 174, 23 p., 10 figs., 11 tbls.
Data from Honolulu long line market and research vessels; sexual differences in catch in area, inter- and intra-year size variations, comparison of size distribution; concludes that male Hawaiin yellowfin attain larger size than female and fairly stable 1 : 0.6 sex ratio in favor of males.

Iverson, E. S. and H. O. Yoshida
1956. Long line fishing for tuna in the central equatorial Pacific, 1954. U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries 184, 33 p., 23 figs., 18 tbls.
Abundance, catch composition, environmental observations, vessel efficiency, sharks and shark damage.

King, J. E. and I. I. Ikehara
1956. Comparative study of food of bigeye and yellowfin tuna in the central Pacific. U. S. Fish and Wildlife Ser., Fish. Bull. 108, vol. 57, p. 61-85, 12 figs., 11 tbls.
Study to compare and determine whether occurring differences associated with horizontal and vertical distribution of these two species and to obtain information on food preferences; contains comprehensive report on food of 605 specimens taken along the Equator in central Pacific October 1950 to June 1953, by long line gear; concludes that great variety, but similarity between each preference.

Shomura, R. S. and T. Otsu
1956. Central north Pacific albacore surveys, January 1954—February 1955. U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries 173, 29 p., 8 figs., 23 tbls.
First in POFI projected series on albacore distribution in Pacific north of Hawaii, containing results from seven exploratory cruises supplemented by Japanese commercial long line catch; description of gear and methods, weather distribution and abundance, environmental conditions, vertical distribution, size, sex ratio of mature individuals, tagging; data indicates seasonal shift in distribution related to similar latitudinal shift in transition zone of mixing between north Pacific and Aleutian currents.

Tester, A. L.
1956. The where and why of albacore. *Pacific Fisherman*, vol. 54, no. 4, p. 21-24, 4 figs.
Review and description of POFI work; oceanography, winter and summer distribution, food factors.

Graham, J. J.
1957. Central north Pacific albacore surveys made to November, 1955. U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries 212, 38 p., 21 figs., 27 tbls.
Results of five cruises by POFI north and northeast of Hawaiian Islands; distribution, abundance, environmental conditions, size composition; concludes that catch associated with Polar Front and with seasonal latitudinal change in surface temperatures.

Iverson, E. S. and H. O. Yoshida
1957. Long line and troll fishing for tuna in the central equatorial Pacific, January 1955 to February 1956. U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries 203, 38 p., 11 figs., 26 tbls.
Description, distribution and abundance of yellowfin in Line Islands as determined by long line and surface troll fishing plus summary of results to date, progress report on tagging program, results of Japanese commercial long line fishery in equatorial waters.

TUNA ADDENDUM

Schaefer, M. B.
1955. Morphometric comparison of yellowfin tuna from southeast Polynesia, Central America and Hawaii. Inter-American Tropical Tuna Commission, Bull., vol. 1, no. 4, 136 p., 7 figs., 7 tbls.
Results of further investigations into possible population differences of Pacific tuna; relative growth, fin lengths, body proportions, results of statistical tests, gill raker counts, effects of freezing experiments; con-

cludes that yellowfin separated into independent or semi-independent populations; possibility of intermingling cannot be excluded.

Schaefer, M. B. and C. J. Orange

1956. Studies of the sexual development and spawning of yellowfin tuna (*Neothunnus macropterus*) and skipjack (*Katsuwonus pelamis*) in three areas of the eastern Pacific Ocean, by examination of gonads. Inter-American Tropical Tuna Commission, Bull., vol. 1, no. 6, p. 283-349, 19 figs., 5 tbls.

Sampling methods and procedures, results of determinations of stage of maturity by gross examination; relationships among fish size, gonad weight, size of ovarian eggs; sex ratios.

Shimada, B. M. and M. B. Schaefer

1956. A study of changes in fishing effort, abundance, and yield for yellowfin and skipjack tuna in eastern tropical Pacific Ocean. Inter-American Tropical Tuna Commission, Bull., vol. 1, no. 7, p. 351-469, 22 figs., 20 tbls.

Resource and fishery problems; measures of yield, abundance and intensity; relationship between abundance and fishing intensity; concludes that amount of fishing has had real effect upon stock of eastern Pacific yellowfin; amount of fishing has little effect on stocks of skipjack.

Broadhead, G. C.

1957. Changes in the size structure of the yellowfin tuna population of the tropical eastern Pacific Ocean from 1947 to 1955. Inter-American Tropical Tuna Commission, Bull., vol. 2, no. 1, 20 p., 2 figs., 1 tbl.

Examination of tuna clipper logbook entries, sales of fishing gear and other evidence relating to effects on fishery; corroborates strong statistical evidence of Shimada and Schaefer (1956) that recent levels of fishing intensity have affected stocks of yellowfin.

Hennemuth, R. C.

1957. An analysis of methods of sampling to determine the size composition of commercial landings of yellowfin tuna (*Neothunnus macropterus*) and skipjack (*Katsuwonus pelamis*). Inter-American Tropical Tuna Commission, Bull., vol. 2, no. 5, p. 174-242, 2 figs., 34 tbls.

Sampling methods and procedures, sources of variation, comparison of methods, sampling efficiency; recommends restriction of all samples to constant 50 fish each; employing only systematic and grab methods for drawing fish to be measured; collections based on frequency modes.

Holmes, R. W., M. B. Schaefer and B. M. Shimada

1957. Primary production, chlorophyll, and zooplankton volumes in the tropical eastern Pacific Ocean. Inter-American Tropical Tuna Commission, Bull., vol. 2, no. 4, p. 129-169, 15 figs., 3 tbls.

Methods of measurements, correlation between surface primary production and zooplankton volumes with surface chlorophyll, radiocarbon uptake, designation of rich and poor areas offshore.

Orange, C. J., M. B. Schaefer and F. M. Larmie

1957. Schooling habits of yellowfin tuna (*Neothunnus macropterus*) and skipjack (*Katsuwonus pelamis*) in the eastern Pacific Ocean as indicated by purse seine catch records, 1946-1955. Inter-American Tropical Tuna Commission, Bull., vol. 2, no. 3, p. 83-126, 9 figs., 9 tbls.

Logbook records, statistical area system, species composition of schools, average catch-per-set, frequency distribution of catch-per-set.

Schaefer, M. B.

1957. A study of the dynamics of the fishery for yellowfin tuna in the eastern tropical Pacific Ocean. Inter-American Tropical Tuna Commission, Bull., vol. 2, no. 6, p. 247-285, 5 figs., 5 tbls.

Mathematical models, estimation of parameters, present status of fishery.

Shimada, B. M.

1958. Geographical distribution of the annual catches of yellowfin and skipjack tuna from the eastern tropical Pacific Ocean from vessel logbook records, 1952-1955. Inter-American Tropical Tuna Commission, Bull., vol. 2, no. 7, p. 289-363, 6 figs., 6 tbls.

Source of data, methods of compilation, reliability of logbook catch estimates, distribution of catches by baitboats, relationship between fishing and oceanographic conditions.

SWORDFISH

Xiphias gladius

Starks, E. C.
1918. The mackerel and mackerel-like fishes of California. Calif. Fish and Game, vol. 4, no. 3, p. 118-129, 12 figs.
Descriptive study with incidental mention of range, seasonal abundance, fisheries.

Gillespie, Annie
1930. Swordfish. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 59-61, 4 figs.
Notes rapid rate of increase after 1925; eastern market shipments; methods of fishing, localities, seasons, area landings, prices.

Scofield, N. B.
1930. Commercial fishery notes. Calif. Fish and Game, vol. 16, no. 2, p. 185.
Development of commercial and sport fishery; claims of diminishing supply; indicates protection might be needed because fish never abundant and fishing intensive.

Van Vorhis, L. G.
1937. Swordfish. *In* The commercial fish catch for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 83-86, 3 figs.
Description; distinction from marlin; detailed description of boats, gear and method of fishing; localities and history of fishery; legislation, demand.

Greenhood, E. C. and J. G. Carlisle, Jr.
1949. Swordfish. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 84-88, 3 figs.
Value of landings; description of boats, gear and methods; development of industry; imports from Japan; formation of Swordfish Association; factors affecting landings such as price, availability, size of fleet and availability of more desirable species.

WHITE SEA BASS

Cynoscion nobilis

Starks, E. C.
1919. The fishes of the croaker family (*Sciaenidae*) of California. Calif. Fish and Game, vol. 5, no. 1, p. 13-20, 8 figs.
Descriptive study with incidental mention of range, seasonal abundance, fishery.

Skogsberg, Tage
1925. Preliminary investigation of the purse seine industry of Southern California. Calif. Div. Fish and Game, Fish Bull. 9, p. 53-63.
Use and effectiveness of gear, importance of purse seiners to white sea bass fishery and of fishery to Southern California fresh fish markets; notes nonexistence of scientific proof bearing on overfishing question; concludes that data not indicate any decline in natural supply, but total yearly catch increase too deceptive to be considered as proof of overfishing.

Clark, F. N.
1930. Size at first maturity of the white sea bass. Calif. Fish and Game, vol. 16, no. 4, p. 319-323, 3 figs., 1 tbl.
Results of observations made at San Pedro fresh fish market; maturity and weight-length relationships; recommends 39.5-40 inches and 23-24 pounds minimum size protection measures.

Whitehead, S. S.
1930a. Analysis of boat catch of white sea bass at San Pedro, California. Calif. Div. Fish and Game, Fish Bull. 21, 26 p., 20 figs.
Record of total catch, average boat catch, description of gear and fishing methods, notations of available data; demand, prices, possible inaccuracies and errors; concludes that trends of average boat catch per month and average boat catch per trip decidedly downward 1918 to 1928, and that fishery in need of protection, whether depleted by natural causes or overfishing.

Whitehead, S. S.
1930b. White sea bass. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 48-51.
Catch records and explanation with brief history of fishery, highlighting 1915 introduction of purse seine; 1924 transfer to gill nets and lamparas because purse seine failed to make big enough catches; also contains explanation of 1925-1927 catch record errors; totuava (*C. macdonaldi*) included until 1928 separation.

Croker, R. S.
1932. The white sea bass and related species that are sold in California fish markets. Calif. Fish and Game, vol. 18, no. 4, p. 318-327.
Descriptive article distinguishing several closely related species under names of white sea bass and corbina, attempting to untangle confusion of common names; identification key to Pacific Cynoscion, photographs and characteristics of seven fishes.

Croker, R. S.
1937. The white sea bass. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 73-75.
decline with listing of contributory factors; scarcity of fish; purse seine boats leaving fishery; necessary restrictive measures.

Fitch, J. E.
1949. White sea bass. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 126-129.
Brief historical account of fishery including range, habits, and habitat; 1947 illegality declaration of operation at Pismo Beach using radio-equipped Army surplus DUKW's and small monoplane; notes that landings recorded not representative of true record of actual pounds caught since nearly all landings eviscerated.

CROAKERS

Queenfish *Seriphus politus*
Spotfin croaker *Roncador stearnsi*
Yellowfin croaker *Umbrina roncador*
White croaker (kingfish) *Genyonemus lineatus*

Starks, E. C.
1919. The fishes of the croaker family (Sciaenidae) of California. Calif. Fish and Game, vol. 5, no. 1, p. 13-20, 8 figs.
Descriptive study with incidental mention of range, seasonal abundance, fishery.

Clark, F. N.
1937. Kingfish. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 93-94, 1 fig.
Fluctuations, composition of catch, method of fishing, gear, landings 1916-1935.

Skogsberg, Tage
1939. The fishes of the family Sciaenidae (Croakers) of California. Calif. Div. Fish and Game, Fish Bull. 54, 62 p., 5 figs., 5 tbls.
External-internal anatomy in handbook form with strict standardization of descriptions, diagnoses of characters; occurrence in California, food, breeding, habitat and behavior, productive areas, seasons, history of restrictive legislation, landings, methods of fishing, commercial importance and sport fishing.
Note: queenfish, p. 13-16; white sea bass, p. 19-33; short fin sea bass, p. 34-35; black croaker, p. 37-39; spotfin croaker, p. 42-44; kingfish, p. 46-52; yellowfin croaker, p. 54-56; California corbina, p. 58-60.

Daugherty, A. E.
1949. Kingfish and queenfish. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 103-104, 1 fig.
Commercial and sport catch, value, fluctuations.

CALIFORNIA CORBINA

Menticirrhus undulatus

Skogsberg, Tage
1939. California corbina. *In* The fishes of the family Scianidae (Croakers) of California. Calif. Div. Fish and Game, Fish Bull. 54, p. 58-60, 2 figs.
Description, diagnosis, synonmy, general range, occurrence in California; food, breeding, importance to sport fishing, protective legislation, fishing methods.

THE SURFPERCHES

Walleye surfperch *Hyperprosopon argenteum*
Barred surfperch *Amphistichus argenteus*
Redtail surfperch *Amphistichus rhodoterus*
White seaperch *Phanerodon furcatus*
Rubberlip perch *Rhacochilus toxotoes*
Pile perch *Rhacochilus vacca*
Black perch *Embiotoca jacksoni*
Striped seaperch *Embiotoca lateralis*
Shiner perch *Cymatogaster aggregata*

Eigenmann, C. H.
1894. On the viviparous fishes of the Pacific coast of north America. U. S. Fish. Comm. Bull. for 1892, vol. 12, p. 381-478, with plates.
Embryological treatment plus bibliography with notes on habitat, abundancy, habits.

Hubbs, C. L.
1917. The breeding habits of the viviparous perch, C. *Copeia*, no. 47, p. 72-74.
1916 observation of copulation act in the estuary waters near Goleta.

Hubbs, C. L.
1921. The ecology and life-history of *Amphigomepterus aurora* and of other viviparous perches of California. Biol. Bull., vol. 40, no. 4, p. 181-209, 5 figs., 9 tbls.
Habitat, breeding season, sex ratio, embryonic development, annuli readings, rate of growth.

Wales, Joseph
1928. Notes on some perches of the family *Embiotoca*. Pomona Coll., Ent. and Zool. J., vol. 20, no. 3, p. 59-64, 3 pls.
Distinctive characteristics, size, abundance, methods and areas of fishing.

Clark, F. N.
1930. Salt-water perch in the San Pedro wholesale fish markets. Calif. Fish and Game, vol. 16, no. 2, p. 139-143, 4 figs., 1 tbl.
Relative importance of each specie in catch; monthly catch; brief observations on breeding habits; concludes that white perch most important with 82% of total catch, walleyed perch 14% and 8 others 4%.

Clark, F. N.
1937. Perch. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 91-93, 1 fig.
Composition of catch, landings, area and gear.

Young, P. H.
1949. Perch. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 108-110, 1 fig., 1 tbl.
Minor historical fluctuations and 1938-1941 low due to lack of fishermen; catch contribution of numerous species, areas of catch, affect of closed season.

Rechnitzer, A. B. and C. Limbaugh
1952. Breeding habits of *Hyperprosopon argenta*, a viviparous fish of California. *Copeia* no. 1, p. 41-42.
1950 observations (with SCUBA assistance) on copulation act at La Jolla; detailed description of breeding habits and grounds; general schooling behavior and isolated breeding behavior; territorial encroachment, aquarium births; concludes that gestation period approximately 5 to 6 months; number of young highest at 12, varies with parental age.

Tarp, F. H.
1952. A revision of the family *Embiotocidae* (The Surfperches). Calif. Dept. Fish and Game, Fish Bull. 88, 99 p., 32 figs.
An attempt to remedy the difficult problem of identification; full descriptions based on populations, plus keys; historical evolution, viviparity, range, habitat, value, geographic distribution.

Note: a fish bulletin on the life history of the surfperch is in preparation (July, 1958) by the staff of the Marine Resources Operations, California Department of Fish and Game.

SHEEPSHEAD

Pimelometopon pulchrum

Janssen, J. F., Jr.

1937. California sheepshead. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 82-83, 1 fig.

Range, commercial and sport fishery significance, productive areas, description, incidental catch by rockfish boats, landings, demand.

Withycombe, J. W.

1949. California sheepshead. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 134-136, 1 fig.

Range, habitat, food, methods and seasons of catch, association with lobster, landings, historical treatment of fishery.

Limbaugh, Conrad

1951. California sheepshead. *Skin Diver*, vol. 1, no. 1, p. 3-4.

Distribution, description, habits, habitat, size, food preferences, maturity.

THE ROCKFISHES

Bocaccio *Sebastodes paucispinis*
Chilipepper *S. goodei*
Yellowtail rockfish *S. flavidus*
Black rockfish *S. melanops*
Blue rockfish *S. mystinus*
Orange rockfish *S. pinniger*
Vermilion rockfish *S. miniatus*
Channel rockfish *Sebastolobus alascanus*
Sculpin *Scorpaena guttata*

Ayres, W. O.
1863. Notes on the Sebastoid fishes occurring on the coast of California, U. S. A. Zool. Soc., London, Proc. no. 26, p. 390-402, 9 figs.
Description, classification, fishing methods, habitat, spawning season.
Note: also printed in Ann. Mag. Nat. Hist. 1864, 3rd Ser., vol. 13, p. 330-342.

Whitehead, S. S.
1929. Rockfish. *In* The commercial fish catch of California for the years 1926 and 1927. Calif. Div. Fish and Game, Fish Bull. 15, p. 32-34, 2 figs.
Trend and composition of catch by years and by districts.

Barnhart, P. S.
1932. Notes on the habits, eggs and young of some fishes of Southern California. Scripps Inst., Tech. Ser., vol. 3, no. 4, p. 93-97, 4 figs.
Based on experiments with ten fish in aquarium; description of gelatinous egg-balloon spawn, time and place of spawn, egg and larval migration; schooling for spawning purposes.

Clark, F. N.
1935. Channel rockfish. Calif. Fish and Game, vol. 21, no. 1, p. 85-86, 1 fig.
Description, habitat, range of *S. alascanus;* connection with sablefish fishery.

Phillips, J. B.
1937a. Rockfish. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 42-47, 5 figs.
Difficulty of identification and classification; description; fishery, average yearly catch 1916-1935, species composition of catch, importance, demand, fishing gear and methods of improvement, reasons for variable landings.

Phillips, J. B.
1937b. Sculpin and cabezone. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 47-49, 2 figs.
Importance, range, average poundage; sculpin seasons.

David, L. R.
1939. Embryonic and larval stages of the grunion and of the sculpin. *Copeia,* no. 2, p. 79-80, 1 pl.
Aquarium observations at Scripps Institute during summer of 1938; embryonic development data and descriptions.

Phillips, J. B.
1939. The rockfish of the Monterey wholesale fish markets. Calif. Fish and Game, vol. 25, no. 3, p. 214-225, 7 figs., 3 tbls.
An attempt to clear confusion at port with regard to names, manner in which market men group species and relative importance of species or groups; scientific names, authorized and fishermen's names, market listing; proportions of different species; notes most important species at Monterey total landings as bocaccio (39.4%), chilipepper (30.8%), yellowtail rockfish (7.9%), vermilion rockfish (6.8%), orange rockfish (6.4%).

Daugherty, A. E.
1949. Sculpin. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 122-124, 1 fig.
Importance in local fresh fish markets, method of catch, range, habitat and behavior; regional landings.

Phillips, J. B.
1949. Rockfish. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 116-120, 3 figs.
Importance of family to commercial and sport fisheries; habitat, fluctuation in catch, gear and methods development; frozen fillet industry development; shift in districts; notes that fluctuations reflect good runs of more profitable species and World War II impetus.

Ahlstrom, E. H.
1952. Pilchard eggs and larvae and other fish larvae, Pacific coast, 1950. U. S. Fish and Wildlife Ser., Spec. Sci. Rpt., Fisheries no. 80, 58 p., 2 figs., 7 tbls.
First in series of reports recording quantitative sampling between Columbia River and Punto Abreojos, Lower California, extending 350 to 400 miles offshore, designed primarily to yield information on sardine; information on other species partially incidental although not unexpected byproduct; tabulation of number of rockfish larvae taken.
Note: see tabulation in following of series:
Ahlstrom (1953), same title, agency and series, no. 102;
Ahlstrom (1954), same title, agency and series, no. 123;
Ahlstrom and Kramer (1955), same title, agency and series, no. 155;
Ahlstrom and Kramer (1956), same title, agency and series, no. 186.

Wales, J. H.
1952. Life history of the blue rockfish, *Sebastodes mystinus*. Calif. Fish and Game, vol. 38, no. 4, p. 485-498, 12 figs., 2 tbls.
Report of study initiated at Hopkins Marine Station 1929; methods, tagging and recovery; scale and body growth, scale characteristics, embryology, distribution habits; concludes that spawn November-January; first maturity of males in third and fourth years, females in fourth and fifth years; commercial catch largely of fifth, sixth and seventh year groups.
Note: modification of MA thesis, Stanford Univ., 1932.

Morris, R. W.
1956. Early larval of four species of rockfish, *Sebastodes*. Calif. Fish and Game, vol. 42, no. 2, p. 149-153, 1 fig., 2 tbls.
Descriptive information on early stages of chilipepper and bocaccio and two others of no commercial importance; general description, melanophores, carotenoids, measurements, identification remarks.

Merkel, T. J.
1957. Food habits of the king salmon, *Oncorhynchus tshawytscha* (Walbaum), in the vicinity of San Francisco, California. Calif. Fish and Game, vol. 43, no. 4, p. 249-270, 4 figs., 8 tbls.
Analysis of 1004 stomach contents; concludes that rockfish constitute 22.5% of total food consumed, regardless of salmon size.

Phillips, J. B.
1957. A review of the rockfishes of California. Calif. Dept. Fish and Game, Fish Bull. 104, 158 p., 66 figs.
Presents uniform, concise description of all species comprising family *Scorpaenidae* in California waters with keys and photographs; history of commercial and sport fisheries; historical survey of nomenclature attempts from Artedi, 1738; definitions of measurements and counts; distribution, description, habitat.
Note: with reference to p. 152-154: those references pertaining to descriptions, lists, keys, check-lists, catalogs, records, etc., not included in current bibliography, as Phillips discusses all nomenclatorial studies with the exception of Ayres (1863), David (1939) and Barnhart (1939) noted above.
Note: condensation appears in *Outdoor California*, vol. 18, no. 7, p. 1, 3, 9-10 (1957).

Phillips, J. B.
1958. Rockfish review. *In* The marine fish catch of California for the years 1955 and 1956. Calif. Dept. Fish and Game, Fish Bull. 105, p. 7-25, 6 figs., 5 tbls.

Historical developments in commercial and sport fisheries; gear; areas of landings, poundage, importance of species; market industry, freezing, meal for livestock, mink and trout foods; fishing regulations; age and growth, maturity and fecundity, spawning, experimental rearing of larvae, tagging efforts, catch statistics; proposes standardized group names for reporting commercial landings.

SABLEFISH

Anoplopoma fimbria

Swan, J. G.
1885. Report on black cod of the north Pacific ocean. U. S. Fish Comm., Bull., vol. 4, no. 15, p. 225-234, 1 fig.
Description, distribution, abundance, seasons; history of entire coastal fishery, industry fishing method, curing.

Tibby, R. B.
1937. Sablefish. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 68, 1 fig.
Range, rank in commercial importance, fluctuations in landings, market demand, use of liver in medicinal oils industry.

Brock, V. E.
1940. Notes on the young of the sablefish. *Copeia*, no. 4, p. 268-270, 1 fig., 2 tbls.
Study of specimens taken during oceanographic cruise of *E. W. Scripps* in spring 1939; measurements, method of swimming, surface water currents, prevailing winds in relation to area of offshore spawning; suggests that large pectoral fin adaptation for surface living an unusual life history hint.

Samson, V. J.
1940. The salt sablefish or "black cod" fishery. *Fishery Market News*, vol. 2, no. 2, p. 3-4.
Devoted to fleet operations, gear used, curing methods with incidental mention of habitat and habits.

Thompson, W. F.
1941. A note on the spawning of the black cod. *Copeia*, no. 4, p. 270.
Increase in commercial importance, measurements of specimens taken in plankton haul samples off Cape St. James; description of eggs, stage of development; indicates that spawning season in that area seems to follow halibut, probably starting in February.

Bell, F. H. and J. T. Gharrett
1945. The Pacific coast black cod. *Copeia*, no. 2, p. 94-103, 1 fig., 2 tbls.
Preliminary statement of some known facts of species and industry; geographical distribution, history of fishery, season, methods and gear, size and age, spawning season, condition of stock, catch per unit of effort; recommends a practial, coast-wide investigation to ascertain type of corrective measures to place fishery on secure and permanently productive basis.

Cox, K. W.
1948. Sablefish run at Monterey Bay. Calif. Fish and Game, vol. 34, no. 1, p. 37.
Notes dramatic appearance of vast numbers, abrupt beginning on July 11 and abrupt end on July 26; estimation of 110 tons landed.

Cox, K. W.
1949. Sablefish. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 120-122, 1 fig.
Range, rank in commercial industry, list of other names by which known, habitat, inshore migration, minor fluctuations and World War II skyrocket in landings; notes exclusive beach-side fishery protected by Newport Beach city charter.

Pacific Fisherman
1949. Tri-state commission throws a block on putting sable under halibut treaty. Vol. 47, no. 11, p. 40.
Records Pacific Marine Fisheries meeting in San Francisco, September 7-8, 1949, and proposals to extend areas controlled by International Fisheries Commission; notes comments by R. S. Croker that California's marine biologists were of opinion that California's sablefish population in no danger of depletion and probably a different population than Pacific northwest.

Phillips, J. B.
1952. Yellow sablefish (black cod) taken in Monterey Bay. Calif. Fish and Game, vol. 38, no. 3, p. 437-438, 1 fig.
Report of specimen with rare coloration; suggests that "calico" phase halfway step between small and adult coloration stage.

Holmberg, E. K. and W. G. Jones
1954. Results of sablefish tagging experiments in Washington, Oregon and California. Pac. Mar. Fish. Comm., Bull. 3, p. 103-119, 1 fig., 12 tbls.
Results of study to determine extent of migration; methods, marking and recovery, migration mileage and time at liberty, fish size, factors affecting recovery; of 9511 tagged, 243 (2.55%) recovered; notes local nature of stocks indicated by returns; emphasizes low number of recoveries.

Phillips, J. B., C. R. Clothier and D. H. Fry, Jr.
1954. A racial study of Pacific coast sablefish, *Anoplopoma fimbria*, based on meristic counts. Pac. Mar. Fish. Comm., Bull. 3, p. 87-101, 2 figs., 8 tbls.
Results of study to determine extent of physical variations between specimens from different geographical regions indicating possibility of separate stocks with little intermingling; gill raker, fin ray and spine counts; catch data; classified summaries of meristic counts; concludes existence of several stocks along Pacific coast with minor intermingling; Central Washington coast to Northern California coast and Central and Southern California coast as two components with little apparent intermingling.

Phillips, J. B. and Seigi Imamura
1954. The sablefish fishery of California. Pac. Mar. Fish. Comm., Bull. 3, p. 5-37, 14 figs., 5 tbls.
Results of two-part study on catch analysis and history and research history of fishery, methods, gear, markets, prices; distribution, fishing areas; fish liver sale by-product; fork and total length, length-weight relationship, spawning season and size at maturity, fish size-water depth relationship; landings by region 1916-1952, number of boats, longline and otter trawl fleet, factors affecting catch; concludes unimportance in Southern California; annual landings comprise one-fifth entire coastal landings; best fishing for large specimens in 200 to 250 fathoms during winter months and 90-165 fathoms in summer months; 95% catch landed in Eureka, Fort Bragg and Monterey regions by longline fleets; strong inverse correlation between total United States cold storage holdings and catch during post-war years; no evidence of depletion, annual fluctuations associated with demand; inter-relationship of coastwise fishery.

Pacific Fisherman.
1955. Two states to bar selling of infant sable under three pounds. Vol. 53, no. 1, p. 27, 2 figs.
Records Oregon-Washington three pound minimum size limit to prevent trawlers occasional take of large loads of immature fish to meet market demand; notes J. B. Phillips' comment that California Bureau of Marine Fisheries deems three pound limit unacceptable because results of tagging program indicate resident, non-migratory nature of stocks supporting California's fishery.

Phillips, J. B.
1958. The fishery for sablefish, *Anoplopoma fimbria*. Calif. Fish and Game, vol. 44, no. 1, p. 79-84, 1 fig.
History and location of fishery, World War stimuli and demand for natural Vitamin A, market competition, apparent decline; distribution, markets; gear and methods of fishing; tagging and racial studies; age, maturity, abundance; concludes that annual fluctuations in catch associated with demand; several non-intermingling Pacific coast populations; regulations contemplated on regional basis; no evidence of depletion in California waters.

LINGCOD

Ophiodon elongatus (Girard)

Walford, L. A.
1930. Cultus cod. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 57-58, 2 figs.
Annual catch by seasonal tendency.

Tibby, R. B.
1937. Pacific cultus. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 69, 1 fig.
Habitat, fishing seasons and methods, landings 1916-1935, fluctuations.

Wilby, G. V.
1937. The lingcod. Canada Biol. Bd., Bull. 54, 24 p., 10 figs.
Description, distribution, habitat, importance to British Columbia fishery, catch statistics, methods, season; spawning migration, egg counts and development, maturity, maximum size, food; notes lack of knowledge regarding growth and extent of migration.

Hart, J. L.
1939. Preliminary report on lingcod tagging. Canada Fish. Res. Bd., Prog. Rept. 42, p. 20-21.
Report on part of biological study initiated at request of fishermen to provide basis for controlling fishery in Straits of Georgia; notes no positive results.

Hart, J. L.
1940. Growth in the lingcod. Canada Fish. Res. Bd., Prog. Rept. 44, p. 14-15, 1 tbl.
Second report on tagging program in British Columbia; record of nine recoveries; growth in length and weight.

Hart, J. L.
1943. Migration of lingcod. Canada Fish. Res. Bd., Prog. Rept. 57, p. 3-7, 4 tbls.
Conclusions based on 208 tag returns; type of tag used, extent and direction of migration, possible sources of error; concludes that most lingcod do not migrate more than nautical mile but that 36% of those recovered demonstrated extensive migration, one to Washington waters; smaller fish probably move more freely than do fish over twelve inches in length.

Holmberg, E. K.
1949. Lingcod. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 103-106, 1 fig.
Fresh fish market demand, importance to sports fishery, methods of fishing, range, total catch fluctuations, possible future decline due to increased pressure on slow-growing species.

CABEZON

Scorpaenichthys marmoratus

Barnhart, P. S.
1932. *Scorpaenichthys marmoratus* (Ayres). *In* Notes on the habits, eggs and young of some fishes of Southern California. Scripps Inst., Bull., Tech. Ser., vol. 3, no. 4, p. 98.
Description of egg mass, spawning inshore movements, coloration of fish, description of 1929 aquarium spawn.

Phillips, J. B.
1937. Sculpin and cabezon. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 47-49, 2 figs.
Range, average yearly landings 1925-1935, incidental fishery.

Bolin, R. L.
1944. A review of the marine cottid fishes of California. Stanford Ichthy. Bull., vol. 3, no. 1, p. 6-8, plate p. 110.
Taxonomic description with brief notes on range, habitat, importance; notes species as end product of sterile evolutionary line.

Phillips, J. B.
1949. Cabezon. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 96, 1 fig.
Range, habitat, landings, low market demand; notes confusion between scorpion, channel rockfish, sculpin and cabezon.

Hubbs, C. L. and A. N. Wick
1951. Toxicity of the roe of the cabezon, *Scorpaenichthys marmoratus*. Calif. Fish and Game, vol. 37, no. 2, p. 195-196, 1 tbl.
Experiment to explain unhappy gastronomic experience; methods, feeding of roe to rats and guinea pigs; five deaths, diarrhea and nasal discharge; recommends not eating roe.

O'Connell, C. P.
1953. The life history of the cabezon, *Scorpaenichthys marmoratus* (Ayres). Calif. Dept. Fish and Game, Fish Bull. 93, 76 p., 40 figs.
Results of study to determine amount of drain on population by six-fold increase in sport landings since World War II; commercial and sport fisheries; range and habitat, food and feeding, reproduction, larval development, length-weight relationship, age and growth, development, color; concludes that crabs constitute half total diet; spawning between October and March; stock will support further increased fishing effort.

CRUSTACEANS

GENERAL

Schmitt, W. L.

1921. The marine decapods of California. Univ. Calif. Publ. Zool., vol. 23, p. 41-43, p. 84-87, 92-94, 108-109, 220-232, figs. and pls.

Portion of results of 1912-1913 biological survey of San Francisco Bay by *Albatross;* systematic discussion and description of species, type locality, distribution; water temperature, salinity and depth; character of bottom.

Johnson, M. E. and H. J. Snook

1927. Seashore animals of the Pacific Coast. The MacMillan Co., p. 298-325, 352-363, 374-383, figs. and pls.

Description, measurements, range, distribution, habits, habitat.

MacGinitie, G. E.

1935. Ecological aspects of a California marine estuary. Amer. Midl. Nat., vol. 16, no. 5, p. 629-765, 16 figs.

Results of eight and one-half year study at Elkhorn Slough, Monterey Bay tributary; description and physical features of study area, methods and materials, tides, bottom soil, plant life, temperature, oxygen, salinity, light, pollution, food supply, abundance of organisms, migrations, parasitism and commensalism.

See especially p. 699-700, 706, 714-715.

Ricketts, E. F. and Jack Calvin

1952. Between Pacific tides. Stanford Univ. Press, 3rd ed., p. 77-78, 152-153, 239.

Description, habitat, range and distribution, commercial uses and fishery; spawning period and fecundity, development, growth rate, movement, feeding, protective legislation history.

MARKET CRAB

Cancer magister (Dana)

Weymouth, F. W.
1910. Genus *Cancer* Linnaeus. *In* Synopsis of the true crabs (Brachyura) of Monterey Bay, California. Stanford Univ. Publ., Univ. Ser. no. 4, p. 35-49, figs. and pls.
Descriptive key to west coast species; systematics, counts and measurements; individual and type variations, distribution and range.

Weymouth, F. W.
1916a. Contributions to the life history of the Pacific coast edible crab. Calif. Fish and Game, vol. 2, no. 1, p. 22-27, 1 fig.
Excerpts from British Columbia Commissioner of Fisheries Report for 1914 (p. 123-129) pertaining to fishing methods at San Francisco, habits, habitat, history of California industry, difference between "soft" and "hard" crab.

Weymouth, F. W.
1916b. Crab fisheries and the crab law. Calif. Fish and Game, vol. 2, no. 1, p. 38-39.
Fishing methods, areas of abundance, effect of restrictions, northern California moulting season.

Weymouth, F. W.
1916c. The Pacific edible crab. Pac. Fish Soc., Trans. (Second Annual Meeting, 1915), p. 20-28.
Fishery, methods and gear; declining status, depletion, legislation, effect of closed season; range, distribution size, feeding habits, breeding, fecundity, tagging and recovery on San Francisco bar and in bay.

Weymouth, F. W.
1916d. Summer migration of edible crabs. Calif. Fish and Game, vol. 2, no. 1, p. 39.
Relationship between advance of salt water into San Francisco Bay tributaries and movement of crabs in search of food.

Weymouth, F. W.
1920. The Pacific edible crab and its near relatives. Calif. Fish and Game, vol. 6, no. 1, p. 7-10, 4 figs.
Size, habitat, importance of edible, slender, and two rock crabs.

California. Bureau of Marine Fisheries
1928. Crab season correct. Calif. Fish and Game, vol. 14, no. 4, p. 316-317.
Discusses objects of restrictive legislation with notes on breeding habits in different localities.

Chute, G. R.
1929. The crab fishery of Monterey Bay, California. Calif. Fish and Game, vol. 15, no. 1, p. 20-33, 3 figs.
Devoted to methods and gear; catch 1918-1928.

Conner, Geraldine
1930. Crabs. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 62-67, 2 figs.
Landings 1916-1928, ports, fishing areas and methods, protective legislation.

Bonnot, Paul
1931. Flat-fish eat crabs. Calif. Fish and Game, vol. 17, no. 2, p. 225-226.
Results of examination of stomach contents of sole specimens taken off Eureka; notes interest in 80 foot depth for crabs.

Phillips, J. B.
1935. The crab fishery of California. Calif. Fish and Game, vol. 21, no. 1, p. 38-60, 6 figs.
Devoted to description of gear, boats and methods and areas fished; incidental description of species and mention of range, habitat, moulting.

Phillips, J. B.
1937. Crabs. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 98-103, 4 figs.
Description, range, habitat, moulting period; specie composition of catch, yearly fluctuations; increase in rock crab catch.

Lahr, L. E.
1939. The crab industry at Eureka. Calif. Fish and Game, vol. 25, no. 4, p. 330-335, 5 figs.
History, gear and methods; packing and cleaning.

Phillips, J. B.
1939. The market crab and its close relatives. Calif. Fish and Game, vol. 25, no. 1, p. 18-19, 6 figs.
Gross description of market, slender, yellow, rock and red crab to aid in ready identification; plates with distinguishing characteristics, color, size, distribution; distinction between male and female, moulting.

Clark, G. H. and Paul Bonnot
1940. The utilization of the California crab resource. Calif. Fish and Game, vol. 26, no. 4, p. 374-380, 4 figs., 2 tbls.
Range, landings by district and month, potentials.

Clark, G. H. and Paul Bonnot
1941. The utilization of California's crab fishery. *Calif. Conservationist*, vol. 6, no. 7, p. 20-22, 4 figs.
Effect of industry concentration in small organized group; history of legislation, average monthly landings by district; recommendations for enlarging industry and increasing catch.

Phillips, J. B.
1949. Crabs. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 151-155, 3 figs.
Importance of species, fishing areas and methods, history of legislative protection; annual landings, ports and poundage.

Orcutt, H. G.
1955(?). The market crab, *Cancer magister* Dana. Calif. Bur. Mar. Fish., 70 p., 31 figs., 6 tbls. (Typewritten) (Available at Calif. Mar. Res. Operations, Stanford, Calif.)
History of fishery and regulations, total landings by area 1916-1954; fishing areas, gear and methods; causes of gradual increase in Eureka landings, methods of preparation for market; distribution, habitat, feeding habits, importance of respiratory current and antennules in locating food, preference for fresh food; mating, spawning, egg and young development, importance of pro-larval stages' duration, moulting, growth and age experiments, age and size at first maturity, key to *Cancer* genus in California; concludes June-August mating season; mating between hard-shelled males and soft-shelled females only; "berried" females appear during October-December; estimated 1.5 million eggs spawned by six-inch female, December-March hatching with late January peak; moulting in Eureka area later than in San Francisco region by about one-and-one-half months resulting in later legal crabbing date opening; increase in body size accomplished by series of rapid increase steps; first capable of producing fertilized eggs in fall of second year.

Dahlstrom, W. A. and H. G. Orcutt
1956. The market crab—science seeks data to maintain thriving resource. *Outdoor California*, vol. 17, no. 11, p. 4-5, 2 figs.
Landings in San Francisco, Eureka and Crescent City, value, poundage, legislation history, trap escape opening; moulting, growth, tagging returns, predation by octopus; fishing areas, methods, gear and success.

Dahlstrom, W. A.
1957. Crab report. Calif. Mar. Res. Operations, 5 p., appendix with 38 tbls., 23 grphs., 15 charts. (Typewritten) (Available at Calif. Mar. Res. Operations, Stanford, Calif.)
Summary of major field activities November 1954-June 1957 to obtain biological data for management procedures to maintain maximum sustained yield under constantly increasing fishing pressure; tagging operations, growth, savings gear, trap and market sampling, maturity, width, weight, larval development; observations on composition, size, condition of harvestable population segment; monthly, seasonal and area landings; concludes that shoulder width and weight increased in San Francisco and

Eureka during 1956-57 season as compared with previous seasons; movements in San Francisco region mostly random, generally to deeper water as season progressed; Eureka-Crescent City movements in northerly direction of considerable distance, to shallower water as season progressed.

SPINY LOBSTER

Panulirus interruptus

Allen, B. M.
1913. The problem of the spiny lobster. *In* Report on Fish and Game. Calif. Fish and Game Comm., Fish Bull. 1, p. 18-26.
Results of investigation of fishery status following 1909 legislative prohibition on capture for two years; natural increase, extended fishing, glutting of market; recommends 10½" minimum and 18½" maximum size limit and need for research.

Scofield, N. B.
1915. The spiny lobster in Monterey Bay. Calif. Fish and Game, vol. 1, no. 3, p. 188.
Discussion of 1912 planting experiment and inability of population to take hold north of Pt. Conception.

Allen, B. M.
1916. Notes on the spiny lobster of the California coast. Univ. Calif. Publ. Zool., vol. 16, no. 12, p. 139-152, 2 figs.
Account of investigations along economic lines from June to January 1911 and summers of 1912 and 1913; description of size, color, armature, habitat, food, enemies, movements.

Barnhart, P. S.
1919. Notes on the artificial propagation of the spiny lobster. Calif. Fish and Game, vol. 5, no. 2, p. 70-71.
Results of a water condition experiment at Scripps Institute; algae and phyllosome development; indicates that berried and hatching individuals seek comparatively quiet water with much vegetation.

Maddox, C. F.
1926. A spiny lobster season at San Diego. Calif. Fish and Game, vol. 12, no. 2, p. 75-76.
Description of handling, cooking, transporting and importing methods.

Fry, D. H., Jr.
1930. California spiny lobster. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 71-74, 3 figs.
Documentation and explanation of upward trend of catch from 1921 to 1928; notes that catch maintained by continuous extension of fishing grounds by improved methods of transportation; development of fishery from small gasoline boats to diesel-powered transports.

California. Bureau of Marine Fisheries.
1931. Lobster quite a traveler. Calif. Fish and Game, vol. 17, no. 3, p. 305-306.
Habitat, habits, deposition of eggs, growth process.

Kinoshita, T.
1933. On the artificial propagation of *Panulirus japonicus* and some account of its larvae. Fifth Pac. Sci. Cong., Proc., vol. 5, p. 4191-4193.
Results of Japanese experiment aimed at unlimited propagation aided by fishing prohibition for certain periods, fishing ground closure, fishing season shortening and protection of young fry and egg-carrying adults.

Maddox, C. F.
1933. A marine drama. Calif. Fish and Game, vol. 19, no. 3, p. 220-222.
Observation of encounter between octopus and lobster, establishing former as potential enemy of lobster.

Van Vorhis, L. G.
1937. Spiny lobster. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 104-107, 2 figs.
Documentation and explanation of catch years 1929-1933; increased demand, general economic conditions, change in importation law.

Phillips, J. B.
1940. Spiny lobster in Monterey Bay. Calif. Fish and Game, vol. 26, no. 2, p. 179-180.
Report of January 1940 find of specimen in purse seine haul for sardines at Moss Landing, attributable to 1913 planting or to straggler wanderings during some prolonged period of warm water.

Pope, E. C., Jr.
1946. Strange behaviour of California marine crayfish. Australian Mus. Mag., vol. 9, no. 1, p. 31.
Notes mass movement of lobsters onto Santa Monica beach; plague of red Peridinians depleting ocean oxygen supply as probable cause.

Summers, Hermann and F. N. Clark
1946. Effect of red water on marine life in Santa Monica Bay, California. Calif. Fish and Game, vol. 32, no. 2, p. 100-101.
Report of samplings taken to ascertain cause of sudden mortality of various marine animals, fish and shell fish in June 1945; lobster most conspicuously affected as four to five tons of dead found; notes probability that unusually heavy growth of *Ceratium tripos* and *Tolykrikos schwartzi* contribution to disturbance in oxygen-carbon dioxide equilibrium.

Aplin, J. A.
1947. The effect of explosives on marine life. Calif. Fish and Game, vol. 33, no. 1, p. 26.
Report of observations and experiments undertaken to determine damage to fish and marine life from use of explosives in geophysical survey work to locate oil deposits along California coast; two experiments on twenty-one specimens indicate lobsters apparently very resistant to concussion and not hurt by seismic survey work.

Chace, F. A., Jr., and W. H. Dumont
1949. The spiny lobster: identification, world distribution and U. S. trade. U. S. Fish and Wildlife Ser., Comm. Fish. Review, vol. 11, no. 5, p. 1-12.
Brief survey based on world-wide samples of morphology and distribution with tables showing economic importance in various geographic regions; productivity by country, description of U.S. trade and a tentative key to spiny lobster tails.

Wilson, R. C.
1949. Spiny lobster. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 155-157, 1 fig.
Documentation and explanation of 1946-1947 catch, noting biggest landing since records began in 1918; greater demand, more lobster fishermen, result of Channel Island areas not fished during World War II; notes that outlook for future sustained high catch doubtful.

Lindberg, R. G.
1955. Growth, population dynamics and field behavior in spiny lobster. Univ. Calif. Publ. Zool., vol. 59, no. 6, p. 157-248, 16 figs., 2 pls.
Results of study of two thousand specimens collected utilizing shallow water diving techniques; mentions circumstantial evidence of overfishing; Southern California a fringe area stocked from south, but not exploited to maximum long-range potential; implications that closed seasons and size limits negligible in value; recommends additional study in these areas; importance of adult recruitment; facts about larval cycle; effect of contamination from industrial waste; reliable catch per unit of effort statistics.

Johnson, M. W.
1956. The larval development of the California spiny lobster. Calif. Acad. Sci., Proc., vol. 29, no. 1, p. 1-19, 22 figs.
Description and comparison of the eleven phyllosoma larval stages in specimens gathered off Baja California and in the Gulf of California; notes that amount of research accorded spiny lobster not commensurate with its economic importance or with its biological interest.

BAY SHRIMP

Crago franciscorum
Crago nigricauda

OCEAN SHRIMP (*Prawn*)

Pandalus jordani
Pandalus platyceros

Townsend, C. H.

1901. The Chinese shrimp fishery of San Francisco Bay. *In* U. S. Comm. Fish and Fisheries, Report for 1900. p. 182-184, 3 tbls.

Extent of industry, yield and value 1889-1898, exports 1890-1898, effect of small-meshed nets.

Scofield, N. B.

1919. Shrimp fisheries of California. Calif. Fish and Game, vol. 5, no. 1, p. 1-12, 6 figs.

An attempt to answer the question of destructiveness of Chinese method of fishing; history of fishery, marketing, average catch in San Francisco Bay.

Clark, G. H.

1930. Shrimp. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 68, 1 fig.

History of small mesh seine industry begun in 1869, Chinese netting action, landings 1916-1928.

Phillips, J. B.

1931. Prawn fishing started at Monterey. Calif. Fish and Game, vol. 17, no. 2, p. 159-162, 2 figs.

Notes accidental catch in octopus trap, initial delivery of fifty pounds August 15, 1930, and subsequent developments; habitat, description; method of one-man fishery.

Bonnot, Paul

1932. The California shrimp industry. Calif. Div. Fish and Game, Fish Bull. 38, 20 p., 11 figs., 5 tbls.

Historical account of San Francisco fishery and legislation; description of boats, gear, methods for market and preparation; description of species taken and catch composition, other marine forms caught in Chinese nets, catch statistics 1915-1930, trawl experiment in Southern California, Monterey prawn fishery.

Israel, H. R.

1936. A contribution toward the life histories of two California shrimps, *Crago franciscorum* (Stimpson) and *Crago nigricauda* (Stimpson). Calif. Div. Fish and Game, Fish Bull. 46, 28 p., 9 figs., 12 tbls.

Only life history study of species making up commercial catch of San Francisco Bay; history of fishery, types of gear used, effect of Chinese netting methods, specie composition of catch; methods and measurements of specimen analyses; description, habitat, length, sexual differences, breeding season, size and sex composition of catch; concludes that species move towards ocean as breeding season approaches; eggs hatch in water of high salinity; young found in shallow water of reduced salinity; females grow more rapidly and attain 25% larger size than males; *C. franciscorum* breeding season December-June, *C. nigricauda* April-September.

Note: adaptation appears in *Calif. Conservationist*, vol. 1, no. 7, p. 9-10 (1936).

Bonnot, Paul

1937. Shrimp. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 107, 1 fig.

San Francisco Bay fishery, specie composition of catch, landings 1916-1935.

Young, P. H. and J. W. Withycombe
1949. Shrimp and prawn. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 157-160, 1 fig., 1 tbl.
History of San Francisco and Monterey Bay fisheries, gear changes, experiment at locating beds with electronic soundings, market and use, total landings 1916-1947.

Johnson, W. C. and A. J. Calhoun
1952. Food habits of California striped bass. Calif. Fish and Game, vol. 38, no. 4, p. 531-534, 2 tbls.
Analysis of 387 stomach contents collected in San Francisco Bay region; possible relationship between minor decline in bass abundance and progressive decrease in shrimp abundance; concludes that shrimp represent 53% total summer volume.

Razum, Albert
1952. Food of the dogfish, *Squalus acanthias*, and the brown smoothhound, *Rhinotriacis henlei*, in San Francisco Bay, California. Univ. Calif., MA thesis, 57 p., 2 figs., 35 tbls., 2 maps. (Typewritten)
Description of study area; food items by frequency and percent of volume based on 307 stomach samples; concludes that dogfish feed characteristically and to greater extent on fish, smoothhound on crustaceans; indications of relatively small area of restricted habitat; smoothhound essentially benthic, dogfish pelagic; anchovy constitutes 17.3% volume of dogfish food items, bay shrimp 10.0%; shrimp constitutes 38.3% volume of smoothhound diet, anchovy 13.8%.

California. Bureau of Marine Fisheries
1955. Shrimp report. 66 p., 79 figs., 13 tbls. (Typewritten) (Available at Calif. Mar. Res. Operations, Stanford, Calif.)
Results of eighteen-month study based on samples of discontinuous and highly concentrated beds off Crescent City, Bodega Bay and Morro Bay; history of previous works on commercially important *Pandalidae* in Scandinavia, British Columbia, Washington and Oregon; location of *P. jordani* beds in California, sex change, catch analyses, comparison of three areas in respect to development and sex change; growth, age, length-weight relationship, spawning and ovigerous period, eggs, ecology, changes in population size composition; concludes that different generations from same area and corresponding generations from three study areas differ in sex change patterns; most females in ovigerous stage have few or no eggs by middle May; one-year old specimens dominant in net hauls; recommends that shrimping season begin in middle May instead of May 1st; possible change in mesh size to permit escapement of one-year old potential spawners.

Best, E. A.
1957. Northern coast's shrimp fishery is growing "baby." *Outdoor California*, vol. 18, no. 2, p. 10-11, 3 figs.
Brief report on five-year old industry; landings, ports, production; sexual change of life transition, charted beds; notes that species actually small prawn, *Pandalus jordani*.

GENERAL

Keep, Josiah

1911. West Coast shells. The Whitaker & Ray-Wiggin Co., p. 32-117, 242-247, 296-298, figs. and pls.

Description, distribution, range, habitat, life history notes, importance.

Packard, E. L.

1918. Molluscan fauna from San Francisco Bay. Univ. Calif. Publ. Zool., vol. 14, no. 2, p. 251-252, 269-272, 281-285, 305-307.

Portions of results of 1912-1913 biological survey by *Albatross;* systematic discussion and description of species, type locality, distribution; water temperature, salinity and depth; character of bottom.

Weymouth, F. W.

1920. The edible clams, mussels and scallops of California. Calif. Fish and Game Comm., Fish Bull. 4, 74 p., 26 figs., 19 pls. in appendix.

Attempt to estimate economic importance of bivalves and make available easy identity; introduction and key to general anatomy, adaptation to environment, list of coastal localities and species present, fishing methods, gear; description, distribution, habitat preference and limits, burrowing and swimming methods, abundance, location of beds, cultivation, use and market, depletion dangers, effect of dredging and pollution.

Johnson, M. E. and H. J. Snook

1927. Seashore animals of the Pacific Coast. The MacMillan Co., p. 411-470, 577-581, figs. and pls.

Description, measurements, range, distribution, habits and habitat.

MacGinitie, G. E.

1935. Ecological aspects of a California marine estuary. Amer. Midl. Nat., vol. 16, no. 5, p. 629-765, 16 figs.

Results of eight and one-half year study at Elkhorn Slough, Monterey Bay tributary; description and physical features of study area, methods and materials; tides, bottom soil, plant life, temperature oxygen, salinity, light, pollution, food supply, abundance of organisms, migrations, parasitism and commensalism.

See especially p. 719-721, 723-735.

Coe, W. R.

1948. Nutrition, environmental conditions, and growth of marine bivalve mollusks. J. Mar. Res., vol. 7, no. 3, p. 586-601, 2 figs., 2 tbls.

Sources of nutrition, ingestion, length increase, temperature, solar radiation, phytoplankton abundance, zooplankton and nekton, benthic invertebrates, chemical and physical conditions; confirms evidence that free starch and glycogen digested in stomach by enzymes secreted by cells of style-sac and incorporated in style; rest of nutrition derived from digestion of minute cells and particles within cells of digestive organ; considerable degree of correlation between growth rate and food supply, temperature, solar radiation.

Smith, A. G. and Mackenzie Gordon, Jr.

1948. The marine mollusks and brachiopods of Monterey Bay, California, and vicinity. Calif. Acad. Sci., Proc., vol. 26, no. 8, p. 147-163, 174, 176, 203-204, 209.

History of collecting activities, physiographic features and mollusk fauna, commercial use, check list of species, habitat, bottom soil, shell and species description, abundance.

Ricketts, E. F. and Jack Calvin
1952. Between Pacific tides. Stanford Univ. Press. 3rd ed., p. 57-60, 176, 194-197, 209-210, 241-242, 239, 302-305.
Description, habitat, range and distribution, commercial uses and fishery; spawning period and fecundity, development, growth rate, movement, feeding, protective legislation history.

Fitch, J. E.
1953. Common marine bivalves of California. Calif. Dept. Fish and Game, Fish. Bull. 90, 102 p., 63 figs.
Habits, habitats, anatomy, locomotion, feeding and nutrition, growth, reproduction, ecological relationships, economic importance, use as food; management problems and techniques, history of legislation; contains oysters, scallop, cockles, clams.

ABALONE

Pink *Haliotis corrugata*
Red *H. rufescens*
Southern green *H. fulgens*
Northern green *H. wallalensis*
Japanese *H. kamshatkana*

Dall, W. H.
1883. Notes on the Pacific coast trade in shell, shrimp, cod and salmon. *In* U. S. Fish Comm., Bull., vol. 3, no. 82, p. 425, 1 fig.
Exports by sea from San Francisco during 1882 compiled from data in *Annual Market Review;* primarily of historical interest; notes value of shells as $23,455, not including over 100,000 pounds of rail export in December.

Ingersoll, Ernest
1887. The abalone fishery. *In* The fisheries and fishing industries of the United States. U. S. Comm. of Fish and Fisheries, Sec. 5, vol. 2, part 20, p. 622-626.
Account of Chinese fishery with derivation of California appellations; Indian use of shells; commerce in shells; extent, value and description of fishery; meat and shells; incidental description of species habits.

Edwards, C. L.
1913. The abalone industry in California. Calif. Div. Fish and Game, Fish Bull. 1, p. 1-15, 4 figs.
Account of Japanese fishery during Eighties; confined to matters of production, manufacture and preservation; details of fishing methods, preparation of food, manufacture of curios and jewelry; experiments in production of blister and free pearls; recommends need for protective preservations in order to establish colonies; brief description of habitat and distribution.

Curtner, W. W.
1917. Observations on the growth and habits of the red and black abalone. Stanford Univ., MA thesis, 21 p., 1 fig., 4 pls. (Typewritten)
Investigation of habitat from Monterey to Cooper's Point; historical use of meat and shells, division and character of rock and ocean floor, effect of fresh water discharge along coast, abundance of vegetation; description of species, food habits, spawning, larval and young development, maturity, movement, shell construction; habitat, effect of sea urchin populations, predation by cabezon and starfish; concludes that sexual maturity reached in sixth or seventh year with approximately twelve-inch circumference; end of February-April spawning; no reason to expect depletion.

Heath, Harold
1917. The abalone question regarding red abalone along Monterey and San Luis Obispo County coastlines. Monterey *American*, March 15; Monterey *Cypress*, March 16.
Habits, spawning, life history notes; dependability upon practically inexhaustible amount of seaweed; concludes that no amount of fishing can materially deplete and very remote possibility of becoming extinct. *Note:* reprinted in Calif. Fish and Game, vol. 11, no. 3, p. 138 (1925).

Thompson, W. F.
1920. The abalones of Northern California. Calif. Fish and Game, vol. 6, no. 2, p. 45-50, 3 figs.
Geographical record by locality of colonies; habitat and abundance.

Berry, S. S.
1921. A distributional note on *Haliotis*. Calif. Fish and Game, vol. 7, no. 4, p. 254-255, 1 fig.
Notes series of shells recorded at Del Monte establishing southern range of *Haliotis kamshatkana*.

Scofield, N. B.
1928. Abalone safe from extermination. Calif. Fish and Game, vol. 14, no. 1, p. 87.
Reasons for existing legislation; description of spawn; movement of young; hysteria generated regarding conservation; concludes that "not to harvest is wasting valuable resource."

Bonnot, Paul
1930. Abalones in California. Calif. Fish and Game, vol. 16, no. 1, p. 15-23, 6 figs.
Historical account of Chinese fishery since 1864; historical account of canning 1905-1928; extremely detailed description of methods, dressing crew operations, packing for shipment; notes minimum demand for shells; brief descriptive section on species, habits, habitat.

Scofield, N. B.
1930. Conservaton laws provide ample protection for abalone. Calif. Fish and Game, vol. 16, no. 1, p. 13-15.
Analysis of conflict between commercial and sports fisheries; bases for restrictive legislation; description of commercial diving methods; opening of Pt. Buchon-Pico Creek district in San Luis Obispo County occasioned by increased public demand for sliced abalone; notes that safe depth for commercial diving at 100 feet precludes depletion.

Croker, R. S.
1931. Abalone. *In* The commercial fish catch of California for the year 1929. Calif. Div. Fish and Game, Fish Bull. 30, p. 58-72, 9 figs.
History of California fishery, combining and reiterating previous works; traces utilization by Indians, Chinese, Japanese and white fishermen; restrictive legislation; methods of fishing and demand leading to healthy growth of populations; notes status as most important mollusk in terms of monetary value; historical and descriptive treatment of Lower California industry; fishing and packing methods in detail, analysis of Oriental market upon which dependent; concludes no foreseeable possibility of depletion.

Woodring, W. F.
1932. A miocene mollusk of the genus *Haliotis* of the Temblor Range. U. S. Nat. Mus., Proc., vol. 81, art. 15, p. 1-4, Plate 1.
Discussion and detailed description of twenty fossil specimens found in hills adjoining Elkhorn Plain in eastern San Luis Obispo County.

Keep, Josiah and J. A. Baily, Jr.
1935. West coast shells. Stanford Univ. Press, p. 140-145.
Devoted to description of shells by species; reference to habits regarding concealment; incidental comments on abundance, distribution, industry, use of meat and shells.

Phillips, J. B.
1937. Abalone. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 107-113, 3 figs.
Brief historical account emphasizing role of Chinese and Japanese in development of industry; detail of fishing methods, gear, processing; notes increasing difficulty to supply demand; notes that legislative development led to efficiently protected fishery while people deriving fullest benefits from resource.
Note: also appears in *California Conservationist* (1938), vol. 3, no. 3, p. 4-5, 20.

Bartsch, Paul
1940. The western American *Haliotis*. U. S. Nat. Mus., Proc., vol. 89, no. 3094, p. 49-59, Plates 6-8.
Handbook description; results of critical examination of genus members occasioned by specimen sent to Smithsonian Institution.

Bonnot, Paul
1940. California abalones. Calif. Fish and Game, vol. 26, no. 3, p. 200-212, 4 figs, 2 tbls.
Results of comprehensive population survey conducted from Monterey to San Miguel Island between October 10 and November 2, 1939; extremely detailed description of animal and plant life on rocky bottoms and status of specie populations; notes on diving and contingencies; development of legislation 1901-1939; commercial landings 1926-1938; maps dives and abalone grounds.
Note: appears in condensed form as "The score on the California abalone," *California Conservationist* (1941), vol. 6, no. 2, p. 4-8.

Carlisle, J. G., Jr.
1945. The technique of inducing spawning in *Haliotis rufescens* Swainson. *Science*, vol. 102, no. 2657, p. 566-567.
Brief notes on April-September investigations initiated by Hopkins Marine Station; description of successful method employed and fertilization and larval development; notes that expulsion of sexual male products easily induced but ovulation difficult.

Bonnot, Paul
1948. The abalone of California. Calif. Fish and Game, vol. 34, no. 4, p. 141-169, 17 figs.
Brief initial discussion of historical increase in demand, reproductive ability, inherent abundance; descriptive details based on information gathered subsequent to Bonnot (1940); tagging experiments; historical account of commercial fishery, methods of processing, sport fishery, use of shells; continual sportsmen-commercial controversy; notes tentative results from tagging indicate delicate adjustment to environment; no extensive migration, irregular varied growth; night forage and return to "home spot."

Bonnot, Paul
1949. Abalone. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 160-161, 1 fig.
Mainly devoted to explanation of basis of change in concentration of fishery; World War II effect, economics, geographical abundance.

Cox, K. W.
1955a. The commercial abalone fishery in California. *In* California abalone. Report to Calif. Legis., Assembly Interim Comm. Fish and Game, Ft. Bragg hearing, August 31, 1955, p. 7-11, 2 figs., 1 tbl.
History of fishery and areas, gear and equipment, diving methods, sale of meat and shell utilization, landings by area 1916-1954.
See Cox (1955b, 1958).

Note: adaptation appears in *Outdoor California*, vol. 18, no. 5, p. 1, 3, 10 (1957).

Cox, K. W.
1955b. A preliminary report of the investigation of the California abalone resource being conducted by the California Department of Fish and Game on direction of the Legislature. *In* California abalone. Report to Calif. Legis., Assembly Interim Comm. Fish and Game, Ft. Bragg hearing, August 31, 1955, p. 2-7, 3 figs.
History of sixty-year dispute between commercial and sports fishery interests; requests to open north coast to commercial divers, subsequent call for investigation by legislature, inauguration of program, methods and results of survey, difficulties of tagging, development of new tags; bottom description, habitat, depth, diving difficulties in area; concludes that shell size not necessarily indicative of age; young do not emerge from under rocks until about four inches in diameter; light sensitivity tends to keep young to darker crevices, cracks and rock undersides; no north coast area investigated could support commercial fishery.
See Cox (1955a, 1958).

Note: adaptation appears in *Outdoor California*, vol. 18, no. 5, p. 1, 3, 10 (1957).

Cox, K. W.
1958. Abalone transplanting successful in California. *Natl. Fisherman*, vol. 39, no. 1, p. 10, 31.
Survival and general condition of specimens in attempt to establish new beds for commercial harvesting; habitat, movement, difficulties in cultivation attempts, differences in growth, effect of harvest on growth, history of fishery and areas, California north coastal opposition to commercial divers, effect of weather and rugged bottom; notes spring and winter spawning; eight-ten day free floating stage; no constant growth and growth not directly proportionate to age.
See Cox (1955a, b) for full report.

CLAMS

Pismo clam *Tivela stultorum*
Softshell clam *Mya arenaria*
Chione (cockle) *Chione fluctifraga, C. undulata, C. californiensis*
Gaper *Schizothaerus nuttalli*
Common Washington clam *Saxidomus nuttalli*
Northern razor clam *Siliqua patula*
California jacknife clam *Tagelus californianus*
Common littleneck clam *Protothaca staminea*
Japanese littleneck clam *Tapes semidecussata*
Bean clam *Donax gouldi*

Heath, Harold
1913. Investigation of the clams of California. *In* Calif. Fish and Game Comm., Fish Bull. 1, p. 27-28.
Partial progress report of survey to determine extent of beds, nature of bottom, temperature, salinity, food supply, breeding habits, growth rate and enemies; habitat of species, effect of pollution, constant digging, experimental beds.

California Fish and Game
1916. Flounders eat clam necks. Vol. 2, no. 3, p. 151.
Record of Tomales Bay predation based on stomach content analysis.

Heath, Harold
1916. California clams. Calif. Fish and Game, vol. 2, no. 4, p. 175-178, 2 figs.
Description of diminishing supply, fecundity, transplanting, breeding seasons, growth.

Weymouth, F. W.
1919. A case of destruction of Pismo clams by oil. Calif. Fish and Game, vol. 5, no. 4, p. 174-175, 1 fig.
Appearance of oil from water ballast discharge by vessel coming into Port San Luis; description of surf, effect on razor and Pismo clams and sand crabs.

Weymouth, F. W.
1921. The abundance of young pismo clam. Calif. Fish and Game, vol. 7, no. 2, p. 103-106, 2 figs.
Habits and habitat of young; estimate of population: 95 million at Pismo and Morro beaches; effect of legislation.

California Fish and Game
1922. Cold water kills Pismo clam. Vol. 8, no. 2, p. 124-125.
Activity of young above low-tide line, effect of cold spell; notes inability to dig in with tide flow because chilled or frozen; casting high on beach; predation by gulls and pelicans.

Weymouth, F. W.
1923. The life-history and growth of the Pismo clam (*Tivela stultorum* Mawe). Calif. Fish and Game Comm., Fish Bull. 7, 120 p., 15 figs., 53 tbls., 18 graphs.
Commercial importance of species, abundance, distribution, range, description, habitat, orientation experiments, nature and importance of growth problem, conservation, age determination methods, age groups, annual rings, length and weight, seasonal variation in growth, effect of temperature and salinity; breeding habits and season, size and number of eggs, fecundity fluctuations; development of larvae and young, method of burrowing, adult and young mortality, natural enemies; concludes July-September spawning period; rapid growth of young until cessation in November; growth resumed in March or April; distinct seasonal rhythm in growth; annual rings accurate age indicators; no doubt of general depletion; protection of adults adequate; poaching on young main cause of depletion.
See Herrington (1930) for presentation of additional data.

Herrington, W. C.
1925. The pismo clam crop. Calif. Fish and Game, vol. 11, no. 3, p. 103-109, 4 figs.
Continuation of Weymouth (1923) determination of spawning success, fluctuations; method of sample collection.

Herrington, W. C.
1926. Depletion of the pismo clam in California. Calif. Fish and Game, vol. 12, no. 3, p. 118-124, 3 figs., 2 tbls.
Continuation of Weymouth (1923-Fish Bull. 7), particularly in regard to annual census; fluctuation in abundance and size, pressure on fishery; effect of size and bag limit restrictions; critical stage of San Luis Obispo County clam beaches and need for additional protection.

Clark, F. N.
1928. Pismo clam census. Calif. Fish and Game, vol. 14, no. 1, p. 86.
Methods of census taking; notes serious depletion and need for law enforcement.

Clark, F. N.
1929. Pismo clam census. Calif. Fish and Game, vol. 15, no. 1, p. 72-73.
Continuation of Weymouth work; availability and depletion; need for additional restrictive measures.

Clark, F. N.
1930a. Pismo clam census. Calif. Fish and Game, vol. 16, no. 1, p. 75-76.
Methods of census taking; notes heavy set of young specimens and paucity of older individuals.

Clark, F. N.
1930b. Large pismo clams. Calif. Fish and Game, vol. 16, no. 2, p. 189-190.
Notes discovery of two specimens estimated at 27 and 23 years.

Herrington, W. C.
1930. The Pismo clam; further studies of its life history and depletion. Calif. Div. Fish and Game, Fish Bull. 18, 67 p., 16 figs., 21 tbls.
Analysis and presentation of data collected since Weymouth (1923); description and yield of fishery, methods and materials of census, age determination, maturity, age and size; effect on growth of dominant year classes, selective fishing, different beach environments; abundance, fluctuations, depletion, enemies; concludes that spawning begins in third or fourth summer; fecundity most closely related to weight; growth rate not affected by crowded conditions produced by dominant year classes; fishery size selection significantly affects growth rate; considerable difference in growth rate on different beaches; 1926 census showed greatest scarcity since records began.

Clark, F. N.
1931. Increasing scarcity of clams in Pismo Beach. Calif. Fish and Game, vol. 17, no. 1, p. 84.
Continuation of census work; survival, open and closed areas, poaching; need to close entire beach to protect population and ensure future.

Weymouth, F. W. and H. C. McMillin
1931. The relative growth and mortality of the Pacific razor clam (*Siliqua patula* Dixon), and their bearing on the commercial fishery. U. S. Bur. Fish., Bull., vol. 46, doc. 1099, p. 543-567, 11 figs., 8 tbls.
Analysis of data accumulated over wide coastal latitude range, based on over 6000 shells; range, distribution, growth ratio, width, position of umbo, direction of rib, variability, sexual differences, mortality, effect of different localities; fishery and regulation; emphasizes size limit as most important restriction; concludes accuracy of annual rings as age indicator and general validity for lamellibranchs; artificial propagation or culture not feasible.

Bonnot, Paul
1932. Soft shell clam beds in the vicinity of San Francisco Bay. Calif. Fish and Game, vol. 18, no. 1, p. 64-66.
List and description of areas with incidental mention of habits, habitat and predators.

Clark, F. N.
1932. The present status of the Pismo clam. Calif. Fish and Game, vol. 18, no. 2, p. 170-180, 5 figs.
History of legislation and scientific investigation; abundance, mortality and survival curves; reasons for failure of protective measures; need for additional restrictions and stricter enforcement of laws.

Croker, R. S.
1934. The Pismo clam in 1933. Calif. Fish and Game, vol. 20, no. 2, p. 156-157.
Condition of population at Pismo-Oceano Beach, mortality and survival, new protective legislation.

Clark, F. N.
1935. The 1934 Pismo clam census. Calif. Fish and Game, vol. 21, no. 2, p. 154-155.
Abundance, size composition of population, need for more restrictions.

Clark, F. N. and R. S. Croker
1936. The Pismo clam in 1935. Calif. Fish and Game, vol. 22, no. 3, p. 249-250.
Report of seventeenth annual census; notes improvement in conditions with spawning clams present in appreciable numbers in intertidal zone; need for enforcing restrictive measures.

Bonnot, Paul
1937. Clams. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 120-121, 3 figs.
Area and habitat of species, landings 1916-1935.

Clark, F. N. and R. S. Croker
1937. Has the closed area increased the Pismo clam population? Calif. Fish and Game, vol. 23, no. 2, p. 161-162, 1 fig.
Analysis of population in District 18A area closed for seven years; notes increase in mature specimens.

Roedel, P. M.
1938. The 1937 Pismo clam census. Calif. Fish and Game, vol. 24, no. 2, p. 196-197.
Population estimate, survival, nature of sets; poaching.

Hawbecker, A. C.
1939. Feeding of gulls on Pismo clams. *Condor*, vol. 41, no. 3, p. 120.
Observations at Sunset Beach, Santa Cruz County; notes that gulls feed on undersized shellfish discarded by human diggers.

Roedel, P. M.
1939. The Pismo clam in 1938. Calif. Fish and Game, vol. 25, no. 2, p. 177-181, 3 figs.
Continuation of census work; population, condition of set, mortality rates, survival, composition of catch, shift of commercial emphasis from Pismo Beach to Morro Bay; effect of tourist diggers, public apathy.

Bonnot, Paul
1940. The edible bivalves of California. Calif. Fish and Game, vol. 26, no. 3, p. 212-239, 17 figs.
Description, habitat, range, size, movement, food, rate of growth factors, maturity; method of catch, importance and use; predators.
Note: Pismo clam, p. 222; Washington clam, p. 223; cockle, p. 225; bean clam, p. 228; jacknife clam, p. 229; razor clam, p. 230-231; gaper clam, p. 232; softshell clam, p. 233.

Roedel, P. M.
1940. Results of the 1939 Pismo clam census. Calif. Fish and Game, vol. 26, no. 2, p. 178-179.
Continuation of work, methods of count; concludes that adult numbers on increase, but total population low.

Roedel, P. M.
1941. Results of the 1940 Pismo clam census. Calif. Fish and Game, vol. 27, no. 2, p. 48.
Continuation of population count; negligible set, prospects for future mature and legal-sized individuals.

Roedel, P. M.
1942. The 1941 Pismo clam census. Calif. Fish and Game, vol. 28, no. 1, p. 66.
Continuation of population count; negligible set, total number low.

Aplin, J. A.
1947. Pismo clam increase. Calif. Fish and Game, vol. 33, no. 3, p. 129-131, 2 tbls.
Presentation of data gathered since last census report; indications of population condition; methods, fluctuations, variations in composition; number and average of clams found in digging sections 1926-1946.

Coe, W. R.
1947. Nutrition, growth and sexuality of the Pismo clam. J. Exper. Zool., vol. 104, p. 1-24.
Habitat, feeding, filtering mechanism; growth observations on 558 marked and planted specimens; unisexual determination, spawning season, maturity.

Loosanoff, V. L.
1947. Commercial clams of the Pacific coast of the United States. U. S. Fish and Wildlife Ser., Fish. Leaflet 223, 7 p.
Range, distribution, abundance, productive beds; habitat, spawning period and water temperature, growth, larvae and young development, mortality; fishery extent, value, methods, regulations.

Aplin, J. A.
1949. Pismo clam. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 165-167, 1 fig.
Original distribution and abundance; intensive, systematic survey of Pismo Beach, commercial industry, sports fishery, Mexican imports.

Bonnot, Paul
1949. Clams. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 161-164, 3 figs.
Character and suitability of coast line, effect of dredging and pollution, specie composition of catch, areas of beds, habitat preference.

Coe, W. R. and J. E. Fitch
1950. Population studies, local growth rates and reproduction of the Pismo clam. J. Mar. Res., vol. 9, p. 188-210.
Results of investigations at La Jolla, Pismo Beach, Port Hueneme, Morro Bay and Lower California to determine extent of local condition influence on population, productivity, rates of growth and spawning seasons; sampling measurement, marking and replanting; notes generally that most productive areas have extensive upswelling of cool oceanic waters with inorganic nutrient materials.

Fitch, J. E.
1950. The Pismo clam. Calif. Fish and Game, vol. 26, no. 3, p. 285-312, 13 figs., 3 tbls.
Compilation in popular account of known information; anatomy, nutrition, growth, sex, maturity, spawning, eggs, larvae, mortality, enemies, effect of man, fishing methods, preparation as food; partial list of plantings, historical account of legislation; notes unnecessary destruction by sports fishermen not replacing undersized specimens.

Shaw, R. F.
1950. The natural history and shell pattern of the Japanese little-neck clam, *Tapes semidecussata*. Univ. Calif., MA thesis, 45 p., 12 figs., 1 tbl., with Appendix. (Typewritten)
Nomenclature and identification, introduction on Pacific coast, ecologic distribution, sex and spawning, size and growth rate, pattern description and development, heredity vs. environment, differential mortality, pigment deposition; concludes that species found on rocky or gravelly beaches in San Francisco Bay; 1:1 sex ratio with no indication of size rate; no association between environmental factors and different pattern frequencies.

Collyer, R. D.
1951. Results of the Pismo clam censuses, 1948, 1949 and 1950. Calif. Fish and Game, vol. 37, no. 3, p. 331-334, 2 tbls.
Methods and study areas; notes lack of young specimens, reduction in total numbers, need for replacing undersized.
See Aplin (1947), Fitch (1950 and 1952).

Pelgen, D. E.
1951. A preliminary estimate of the effects of waste discharge on Elkhorn Slough, Monterey County. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-15, 6 p., 1 fig. (Typewritten)
Clamming and oyster cultivation attempts; effects of industrial waste discharges; concludes that discharge causing relatively minor damage.

Fitch, J. E.
1952. The Pismo clam in 1951. Calif. Fish and Game, vol. 38, no. 4, p. 541-547, 4 tbls.
Report of 1951 census at Pismo Beach and Morro Bay sections; procedures; notes hopeful effect of new law on returning undersized clams; concludes that crop in intertidal areas in sad state attributable to incoming year class failure, clamming pressure, public failure to rebury undersized specimens.
See Aplin (1947), Fitch (1950) and Collyer (1951).

Coe, W. R.
1953. Resurgent populations of littoral marine invertebrates and their dependence on ocean currents and tidal currents. *Ecology*, vol. 34, no. 1, p. 225-229, 1 fig.
Partial results of bean clam study reported in Coe (1955); resurgent years, population density, 1937-38 fishery and commercially canned broth, subsequent disappearance, infestation with disease, reproductive capacity, effect of currents; concludes that presence of minute unicellular organism in tissues and cavities apparently causative agent of mass death.

Fitch, J. E.
1954. The Pismo clam in 1952 and 1953. Calif. Fish and Game, vol. 40, no. 2, p. 199-201, 4 tbls.
Results of December 14-18, 1952 census work; notes exceptionally poor recruitment and value of clam sanctuaries.

Coe, W. R.
1955. Ecology of the bean clam *Donax gouldi* on the coast of southern California. *Ecology*, vol. 36, no. 3, p. 512-515, 2 figs.
Results of seventeen-year investigation on irregular and unpredictable resurgent populations at La Jolla; arrival times, nature of food, growth rates at various ages and seasons, parasites and predators, maximum life span, years of seven resurgent populations with immense numbers 1895-1950; breeding population, free-swimming larvae action, habitat and scattering of young; concludes that first spawning at about one-and-a-half years; spawning season April-November; fecundity of 1000-50,000 ova; heavy predation by gulls, rays, corvina and surf perch; 1949 resurgence changed population from average of less than one clam per square meter to more than 20,000 in two months; most die during second year.
See Coe (1953) for explanation of sudden death.

Fitch, J. E.
1955. Results of the 1954 Pismo clam census. Calif. Fish and Game, vol. 41, no. 3, p. 209-211, 3 tbls.
December 8-11 sampling of regular sections; number by age group for sections; notes poor recruitment at Morro since 1944, at Pismo since 1947; concludes that species needs five to eight years growth to reach legal size.

Fitch, J. E.
1957. The plight of the Pismo clam. *Outdoor California*, vol. 18, no. 1, p. 3-4, 1 fig.
Report of 1956 yearly census; methods and materials; age and size composition of population, survival, mortality, effect of restrictive legislation; spawning, fecundity, larvae development.

OCTOPUS

Paroctopus apollyon
Octopus bimaculatus

Barry, S. S.
1912. A review of the cephalopods of western North America. U. S. Bur. Fish., Bull., vol. 30, p. 267-336.
Morphometric and handbook description of species known to occur or reported between Bering Straits and the Corona Islands.

Heath, Harold
1917. Devilfish and squid. Calif. Fish and Game, vol. 3, no. 1, p. 103-108, 4 figs.
Account of storytellers from Victor Hugo to fishermen on docks; attempt to separate fact from fiction; reasons for mollusk classification, habits, description, predators, movement.

Phillips, J. B.
1934. Octopi of California. Calif. Fish and Game, vol. 20, no. 1, p. 20-29, 3 figs.
Popular description of common octopus; habits, habitat, commercial importance; fishing methods, localities, seasons and yield, type of boats used, demand; detailed description of seven species along California coast.

Croker, R. S.
1937. Octopus. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 118-119, 1 fig.
Landing count from 1916-1935, demand, Monterey center of fishery, fishing methods, description of *bimaculatus* sport fishery.

Cox, K. W.
1949. Octopus. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 170-172, 1 fig.
General coolness of public regarding octopus as food, fishing methods; notes name change from *P. hongkongensis* to *Paroctopus apollyon* and *Octopus bimaculatus*; change in leading port from Monterey to Eureka; recipe for cooking.

OYSTERS

Giant Pacific oyster *Crassostrea gigas*
Native oyster *Ostrea lurida*
Eastern oyster *Crassostrea virginica*

Townsend, C. H.

1901. Eastern oysters in San Francisco Bay. *In* U. S. Comm. Fish and Fisheries, Report for 1900, p. 179, 1 tbl.

Development of industry, imports of yearling seed specimens, natural increase.

Scofield, N. B.

1928. Oyster in California. Calif. Fish and Game, vol. 14, no. 3, p. 203-204.

Brief account of propagation attempts with incidental mention of habits and habitat requirements.

Coe, W. R.

1930. The life cycle of the California oyster (*Ostrae lurida*). Anat. Rec., vol. 47, no. 3, p. 359.

Brief note on material presented in Coe (1931); spawning period, fertilization and development of eggs, growth of young, sexual maturity.

Coe, W. R.

1931. Sexual rhythm in the California oyster (*Ostrea lurida*). *Science*, vol. 74, no. 1914, p. 247-249.

Report of suspension block experiments at Scripps Institute; microscopic analysis of specimens collected, transitional stages, sequences of sexual phases, description and development of phases; effect of stimuli, body metabolism, environmental conditions; concludes that spawning occurs on southern California coast during seven or more months of year; *Ostrea lurida* characterized as protandric hermaphrodite.

See Coe (1930).

McMillin, H. C. and Paul Bonnot

1931. Oyster culture in California. Calif. Fish and Game, vol. 17, no. 3, p. 246-251, 5 figs.

History of industry, importations, methods and materials of culture process, reduction of drill infestations.

Coe, W. R.

1932a. Development of the gonads and the sequence of the sexual phases in the California oyster. Scripps Inst., Bull., Tech. Serv., vol. 3, p. 119-144, 4 figs., 3 pls.

Effect of season, temperature and other environmental conditions on sequence based on system of experimental blocks set in water; spawning season, temperature tolerance, description of the rhythmical phase.

Coe, W. R.

1932b. Oyster. *In* Season of attachment and rate of growth of sedentary marine organisms at the pier of the Scripps Institution of Oceanography, La Jolla, California. Scripps Inst., Bull., Tech. Ser., vol. 3, no. 3, p. 54-60, 1 fig., 1 tbl.

Report of four and one-half year study on experimental suspension blocks; water temperatures; spawning period, growth, maturity of *Ostrea lurida;* sequence of sexual phases; notes reproductive period April to October or November.

McMillin, H. C. and Paul Bonnot

1932. Oyster pests in California. Calif. Fish and Game, vol. 18, no. 2, p. 147-148.

Effects of incidental introduction of Eastern drill and slipper shell into California bays; economic importance on oyster beds, methods of prevention; need for inspection of foreign seed transplantings.

Coe, W. R.

1934. Alternation of sexuality in oysters. Amer. Nat., vol. 48, no. 716, p. 236-251, 6 figs., 2 tbls.

Results of investigation to determine nature of influences controlling sexual changes; geographical variations, phases, breeding seasons; primary bisexual gonads; hermaphroditic, secondary and true males; self-fertilization, sex ratios, sex and size correlation.

Bonnot, Paul
1935. The California oyster industry. Calif. Fish and Game, vol. 21, no. 1, p. 65-80, 6 figs.
History of introduction, bed locations, fishery; biology and culture, enemies.

Note: condensation appears in *Calif. Conservationist*, vol. 1, no. 3, p. 14 (1936).

Bonnot, Paul
1936. Report of the oyster investigation at Humboldt Bay for 1935. Calif. Fish and Game, vol. 22, no. 4, p. 284-293, 8 figs.
Spawning, setting and manner of collection; maturity; salinity and temperature of water; history of industry; presence of drills and slipper shells.
See Bonnot (1937a, 1938) for continuation.

Bonnot, Paul
1937a. Oysters. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 119-120, 3 figs.
Market and use of species, importations of seed, landings 1916-1935.

Bonnot, Paul
1937b. Report on the California oyster industry for 1936. Calif. Fish and Game, vol. 23, no. 2, p. 163-173, 6 figs.
Continuation of work; native and introduced species; innovation by spat collectors; depredation by rays and crabs; maturity rates.
See Bonnot (1936, 1938).

Bonnot, Paul
1937c. Setting and survival of spat of the Olympia oyster, *Ostrea lurida*, on upper and lower horizontal surfaces. Calif. Fish and Game, vol. 23, no. 3, p. 224-228, 2 figs., 2 tbls.
Planting, spat catching, requirements for survival.

Hopkins, A. E.
1937. Experimental observations on spawning, larval development, and setting in the Olympia oyster, *Ostrea lurida*. U. S. Bur. Fish., Bull., vol. 48, no. 23, p. 439-503, 41 figs., 34 tbls.
Report of studies at Puget Sound; methods of cultivation, predation, hydrographical observations, spawning, larvae development, setting.

Bonnot, Paul
1938. Report on the California oyster industry for 1937. Calif. Fish and Game, vol. 24, no. 2, p. 191-195, 1 fig.
Third year of research; success of experiment, mortality, duration and intensity of sets; nature of spawn, temperature requirements, influence of tides; data from other areas in state.
See Bonnot (1936, 1937a).

Bonnot, Paul
1940a. Methods of collecting oyster spat. Amer. Fish. Soc., Trans., vol. 69, p. 263-267, 1 fig.
Development of two types of collectors in effort to rehabilitate once prosperous California industry; history of industry 1870-1931, inauguration of program in 1931, introduction of seed, water temperature fluctuations; methods and materials of increasing number of surfaces for larvae attachment, relative efficiency of collectors.

Bonnot, Paul
1940b. Native oyster. *In* The edible bivalves of California. Calif. Fish and Game, vol. 26, no. 3, p. 214.
Description, habitat, range, size, movement, food, rate of growth factors, maturity; method of catch, importance and use; predators.

Dolder, E. F.
1941. Looking toward a California oyster industry. *Calif. Conservationist*, vol. 6, no. 3, p. 1-4, 9 figs.
History and description of ten-year program to encourage culture in California; plantings, areas, growth, species, fishery, price.

Outdoor California

1941. Oyster culture in California. Vol. 1, no. 26, p. 1.

History of industry, planting of seed, increase of native stock; notes $30,000 market value of 1,500,000 pounds taken from Drake's Bay beds in 1940.

Bonnot, Paul

1949. Oysters. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 167-170, 3 figs.

History of three species, importations, seed plantings, holding beds, industry; effects of pollution and dredging.

Orcutt, H. G.

1955(?). Oyster culture in California. Calif. Mar. Res. Operations, 50 p.

Results of survey initiated upon rebirth of industry; review of literature, biology and culture methods; history of California industry, attempts to harvest native species; Eastern, Mexican and Japanese imports test planting; aquaculture spawning, clutching, planting, fattening, harvesting, shucking; seed production in Japan, inspection for drills; erroneous concepts regarding "poisoning"; sex reversal, egg production, reproductive season during summer months, effect of "red tide," feeding process, egg and larval development, larvae haul and count methods; experimental and established culture areas, description and control of drills; effect of worms, rays, starfish and rock crabs; concludes that marketable size attained in four years by natives and in one and one-half to two years by Pacifics; 250,000 egg production by native, 10,000,000 by Pacifics; maturity attained at end of second summer; 68° minimum spawning temperature.

Note: appendix contains "Control of Japanese oyster drills" by C. E. Lindsay and D. C. McMillin, Puget Sound Oyster Bull., ser. 9, no. 1 (1950); and "History of transplantations of Japanese oysters to the United States."

Orcutt, H. G.

1956. Oysters: booming industry has potential greater than in "good old days." *Outdoor California*, vol. 17, no. 5, p. 10-11, 13, 2 figs.

Program of state agency fostering establishment and growth of fishery in areas formerly unproductive; history of legislation, multiple use of bays, consideration of clam and black brant resource requirements; harvest of four species, planting operations, landings of crop; growth, predation by drills and bat rays, weed control, storms and pollution.

Ripley, W. E.

1957. Revived oyster industry grows from rich bays. *Outdoor California*, vol. 17, no. 12, p. 6-7, 3 figs.

Notes effect of regulation revitalization; importation of spat, prevention of drill introduction; production and dredging figures, growth of industry, production tax increase.

SCALLOP

Pecten circularis
Hinnites multirugosus

Bonnot, Paul

1940. The edible bivalves of California. Calif. Fish and Game, vol. 26, no. 3, p. 215, 17 figs.

Description, habitat, range, size, movement, food, rate of growth factors, maturity; method of catch, importance and use; predators.

Nelson, H. L.

1949. Scallops. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 179.

Records 1920, 1921, 1937 and 1939 poundage landed.

SQUID

Loligo opalescens
Doscidicus gigas

Heath, Harold
1917. Devilfish and squid. Calif. Fish and Game, vol. 3, no. 1, p. 103-108, 4 figs.
Account of storytellers from Victor Hugo to dock fishermen; attempt to separate fact from fiction; reasons for mollusks classification, habits, description, predators, movement.

Scofield, W. L.
1924. Squid at Monterey. Calif. Fish and Game, vol. 10, no. 4, p. 176-182, 4 figs.
Historical account; habits, range; methods, yield, localities, abundance relative to methods and absence of fish; details of preparation and processing.

Classic, R. F.
1929. Monterey squid fishery. Calif. Fish and Game, vol. 15, no. 4, p. 317-320, 3 figs.
Increase in fishery, seasons, methods, processing.

Phillips, J. B.
1933. Description of a giant squid taken at Monterey with notes on other squid taken off the California coast. Calif. Fish and Game, vol. 19, no. 2, p. 128-136, 3 figs.
Description of rare species washed ashore; general notes, description on others.

Clark, F. N. and J. B. Phillips
1936. Commercial use of the jumbo squid, *Doscidicus gigas*. Calif. Fish and Game, vol. 22, no. 2, p. 143-144
Reasons for sudden appearance in considerable abundance in southern California summer and fall 1935; description, habits.

Croker, R. S.
1937. Further notes on jumbo squid. Calif. Fish and Game, vol. 23, no. 3, p. 246-247.
Recounts Clark and Phillips (1936) and attempts to develop fishery; devoted mainly to nuisance factor relative to commercial and sport fishery; bounty request and suggestions.

Phillips, J. B.
1937. Squid. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 113-118, 4 figs.
Variation in supply and demand 1916-1935; fluctuations in catch; notes that commercial drying at Monterey dependent upon stability of silver, medium of exchange in China, the leading market.

Classic, R. F.
1949. Squid. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 172-175, 2 figs.
Schooling, spawning, migratory habits; poundage, development of frozen squid market, reasons for 38,000,000 pound 1946 catch; notes it represents speculation and over-estimation of Philippine market.

Fields, W. G.
1950. A preliminary report on the fishery and on the biology of the squid. Calif. Fish and Game, vol. 36, no. 4, p. 366-377, 6 figs.
Summarizations of observations on few phases of investigation to increase previously fragmentary knowledge; history; composition of spawning population, spawning area and season, maturity, physical change after spawning.

McGowan, J. A.
1954. Observations on the sexual behavior and spawning of the squid at La Jolla, California. Calif. Fish and Game, vol. 49, no. 1, p. 47-54, 5 figs.
Direct observations assisted by Aqua-lung; plankton hauls, laboratory rearing on unusually large spawning population February-March 1953, in Sea Lion Gulch branch of La Jolla submarine canyon; concludes that population ready to spawn moves into relatively shallow inshore waters; sandy bottoms of semi-protected bays; both parents die after spawning.

ANADROMOUS FISHES

GENERAL

Erkkila, L. F. and others

1950. Sacramento-San Joaquin Delta fishery resources: effects of Tracy pumping plant and Delta Cross Channel. U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries 56, 109 p., 12 figs., 27 tbls.

Magnitude, composition, occurrence of fish populations; effect of Delta hydrodynamics and other environmental factors; ways and means of protecting and maintaining populations; eggs, larvae and adults taken; migrations, spawning areas and times, water flow and volume; notes that early life stages occurred in abundance in relation to water volume; concentration of populations in large open-water areas most susceptible to tidal action; management recommendations.

California. Department of Fish and Game. Inland Fisheries Branch.

1957. Problems of the Sacramento River migratory fisheries. Adm. Rept. 57-2, 33 p., 4 figs., 17 tbls. (Processed)

Brief history of Sacramento-San Joaquin gill net fishery, methods and grounds; effect of commercial gill netting on striped bass, number of available spawning beds, spawning run records, fishing pressures, shad and salmon seasons and catch; management recommendations.

United States. Bureau of Reclamation and Fish and Wildlife Service.

1957. Fish protection at the Tracy pumping plant, Central Valley Project, California: development of a fish salvage facility. 96 p., 61 figs., 15 tbls.

Devoted to design, installation and operation of fish screening system; general description of areas, importance for spawning and rearing striped bass, shad and king salmon; volume, flow and temperature; fish populations, migration, spawning season and areas.

SALMON

King salmon Oncorhynchus tshawytscha
Silver salmon Oncorhynchus kisutch

Stone, Livingston

1874. Report of operations during 1872 at the United States salmon-hatching establishment on the M'Cloud River; and on the California *Salmonidae* generally; with a list of specimens collected. U. S. Comm. Fish and Fisheries, Report for 1872 and 1873, Part II, p. 168-215.

Location and description of breeding station; conditions of hatching specimens, methods of catch, obtaining eggs; hatching apparatus; description of course of Sacramento River, McCloud River and Indians; general description and movements of fish population in lower and upper portions of river system; distribution, abundance, size, migrations, food reproduction, diseases, parasites; artificial culture, protection, value.

Stone, Livingston

1884. The quinnat or California salmon—*Oncorhynchus chouicha. In* The fisheries industry in the United States. U. S. Comm. Fish and Fisheries. Sec. I, pt. III, p. 479-485.

Development of scientific name, distribution, methods of fishing; development of egg, young, feeding habits, color changes; notes lack of knowledge of ocean history; notes deep-sea food in stomachs when reappearing at river mouth and seals' predation; character, time, speed of river ascent; spawning, physical deterioration.

Stone, Livingston

1885. Report of operations at the United States salmon-breeding station on the McCloud River, California, during the year 1883. U. S. Comm. Fish and Fisheries, Report for 1883, Part XI, p. 989-1000, 3 tbls.

Record of seine hauls, eggs taken, air and water temperature; effect of blasting by California Oregon Railroad.

Jordan, D. S. and C. H. Gilbert

1887. The salmon fishery of California and of Oregon south of the Columbia River. *In* The fisheries industry in the United States. U. S. Comm. Fish and Fisheries. Sect. V, vol. 1, pt. XIII, p. 731-740.

Fishing towns, areas, methods; processing; numbers of fish brought to San Francisco markets; Eel River fall runs of king and silver.

Rutter, Cloudsley

1903. Natural history of the quinnat salmon: a report of investigations in the Sacramento River, 1896-1901. U. S. Bur. Fish., Bull., vol. 22 (1904), p. 65-141, 17 pls., figures and tables in text.

History and method of investigation; description of river as salmon stream; eggs and milt, vitality of spermatozoa, ova experiments; alevin observations, plantings, enemies; fry migrations, summer residents, food; period of growth; adult migration, changes, sex comparisons, natural propagation, injuries, disease and death; concludes that fry begin downstream migration as soon as able to swim; fry four or five months old upon reaching ocean; some late fry remain in headwaters; insects exclusive food; homing instinct operative; 85% fertilization in natural propagation.

Rutter, Cloudsley

1907. The fishes of the Sacramento-San Joaquin basin, with a study of their distribution and variation. U. S. Bur. Fish., Bull., vol. 27, doc. 637, p. 150.

Spawning runs, seaward migration, principal spawning streams.

Gilbert, C. H.

1913. Age at maturity of the Pacific coast salmon of the Genus *Oncorhynchus*. U. S. Bur. Fish., Bull., vol. 32 (1914), doc. 767, p. 1-22, 3 tbls., 29 pls.

Preliminary statement of life history facts determined from scale reading studies; numbers reported, size, age, migration; concludes that king spawn in fourth-seventh year, females preponderantly four-year fish; king may migrate shortly after hatching or reside in fresh water until second spring.

Note: king, p. 11-15; silver, p. 15-17.

Scofield, N. B.
1913. A general report on a quinnat salmon investigation, carried on during the spring and summer of 1911. *In* Report of fish conditions. Calif. Fish and Game Comm., Fish Bull. 1, p. 35-41.
Reasons for artificial propagation; determination of cause of great loss between hatchery release and return upstream spawning runs; number of eggs deposited, lack of territorial action by parent, place of artificial propagation; notes that results not good; fields for improvement; description of basis and work accomplished; breaks, weirs, ditches.

Shebley, W. H.
1915. Rearing and feeding salmon fry in California. Pac. Fish. Soc., Trans. (First Annual Meeting, 1914), p. 85-90.
History of collection, rearing, distribution; federal and state hatchery operation; handling of eggs, fry; rearing ponds, problems of lower Sacramento River.

O'Malley, Henry
1916. Economical foods for rearing salmon. Pac. Fish. Soc., Trans. (Second Annual Meeting, 1915), p. 41-44.
Types, methods of preparation, successful diets; recommends mixed diets.

Scofield, N. B.
1916. The humpback and dog salmon taken in San Lorenzo River. Calif. Fish and Game, vol. 2, no. 1, p. 41.
Notes Santa Cruz County appearance of stray individual far out of range.

Rich, W. H.
1920. Early history and seaward migration of chinook salmon in the Columbia and Sacramento Rivers. U. S. Bur. Fish., Bull., vol. 37 (1922), doc. 887, p. 1-74, 9 graphs, 56 tbls., 4 pls.
First report of study initiated in 1914; history of investigation, methods; numbers of species collected, size, average length, number of rings, growth indices; rate of growth, development of scales, migration, sex ratio, relative size of male and female, precocious males; concludes that fry first appear January-February; four-inch average yearling length; scale length and ring numbers closely parallel fish length; distinct migration of fry January-June.
Note: material extracted for Sacramento River populations, p. 32-42.

Scofield, W. L.
1920. King salmon marking experiments at Klamath River, 1919. Calif. Fish and Game, vol. 6, no. 3, p. 101-104, 1 fig.
Report of initiation of experiment on 25,000 individuals; source of eggs, marking methods, liberation.
See Snyder (1922, 1923, 1924).

Rich, W. H.
1921a. An instance of adult, sea-run chinook salmon found feeding in fresh water. Calif. Fish and Game, vol. 7, no. 1, p. 7-8, 1 fig.
Description of factors causing salmon to cease feeding on entering stream for spawning purposes.

Rich, W. H.
1921b. The relative maturity of the chinook salmon taken in the ocean along the Pacific coast. Calif. Fish and Game, vol. 7, no. 1, p. 12-22, 5 figs., 10 tbls.
Preliminary report dealing with troll and purse seine specimen; method of determining maturity based on variations in the size of the eggs.
See Rich (1925).

Snyder, J. O.
1921a. Three California marked salmon recovered. Calif. Fish and Game, vol. 7, no. 1, p. 1-6, 4 figs.
Analysis of scales for rate of development; notes added sea range.

Snyder, J. O.
1921b. How many eggs does a salmon lay? Calif. Fish and Game, vol. 7, no. 1, p. 63-64.
Results of examination of thirty Klamath River specimens with chart giving number of eggs and length, weight and age of fish; average number 3572.

McGregor, E. A.
1922. Observation of the egg yield of Klamath River king salmon. Calif. Fish and Game, vol. 8, no. 3, p. 160-164, 2 figs., 2 tbls.
Examination of ovaries of 68 specimens using method described in Snyder 1921; relation between age and number of eggs and length and number of eggs.

Snyder, J. O.
1922. The return of marked king salmon grilse. Calif. Fish and Game, vol. 8, no. 2, p. 102-107, 3 figs., 6 pls.
First published results of 1918 marking experiment; interpretation of scale readings with regard to growth.
See Scofield (1920) and Snyder (1923 and 1924).

McGregor, E. A.
1923a. Notes on the egg yield of Sacramento River king salmon. Calif. Fish and Game, vol. 9, no. 3, p. 134-138, 1 fig., 1 tbl.
Continuation of egg count and difference between Sacramento and Klamath River females; Sacramento individuals yield exceeds Klamath River by 91%.

McGregor, E. A.
1923b. A possible separation of the river races of king salmon in ocean-caught fish by means of anatomical characteristics. Calif. Fish and Game, vol. 9, no. 3, p. 138-150, 4 figs., 10 tbls.
Consideration of ova, pyloriccoeca, gill raker and vertebra counts indicate two races in Klamath and Sacramento River populations.

Snyder, J. O.
1923. A second report on the return of king salmon marked in 1919, in Klamath River. Calif. Fish and Game, vol. 9, no. 1, p. 1-9, 1 fig., 4 tbls., 3 pls.
Second published results of 1918 marking experiment; sea range and parent streams; sex representation; scale interpretation and growth, age and distribution.
See Scofield (1920) and Snyder (1922 and 1924a).

Snyder, J. O.
1924a. A third report on the returns of king salmon marked in 1919 in Klamath River. Calif. Fish and Game, vol. 10, no. 3, p. 110-114, 2 figs., 3 tbls.
Continuation of 1918 marking program and recoveries study; summarization of entire program; concludes that salmon return to stream in which reared rather than to that of real parentage; nuptial migrations very regular in time; artificially propagated individuals mature and grow almost identically with others; long distant sea range from mouth of parent stream.
See Scofield (1920) and Snyder (1922 and 1923).

Snyder, J. O.
1924b. Indian methods of fishing on Trinity River and some notes on the king salmon of that stream. Calif. Fish and Game, vol. 10, no. 4, p. 163-172, 7 figs., 1 tbl.
Behavior in stream, age and sex.

Snyder, J. O. and E. C. Scofield
1924. An experiment relating to the homing instinct of the king salmon. Calif. Fish and Game, vol. 10, no. 1, p. 9-17, 7 figs., 2 tbls.
Outline of experiment to transfer marked fish in tributaries other than those in which reared.

Rich, W. H.
1925. Growth and degree of maturity of chinook salmon in the ocean. U. S. Bur. Fish., Bull., vol. 41, doc. 974, p. 15-90, 42 figs., 27 tbls.
Report of results gathered subsequent to publication of preliminary report; methods in age and relative maturity determination, correlation between eggs and fish size, relative maturity of ocean caught specimens,

size, length-weight relationship, age composition; concludes that eggs undergo well-marked differential growth preceding and terminating in migration; more young remain in home stream for at least one year; ocean catch tending to deplete population; recommends restriction of commercial catch to river areas of upstream migration.

Note: material regarding specimens taken in Columbia River and ocean waters off mouth, p. 28-63; in Monterey Bay, p. 63-67; from Drakes Bay to Ft. Bragg, p. 67-69.

See Rich (1921b) for preliminary report.

Clark, G. H.

1929a. Sacramento River salmon fishery. Calif. Fish and Game, vol. 15, no. 1, p. 1-10, 4 figs.

Historical development of industry; artificial propagation attempt; notes causes of depletion as overfishing, cutting off of spawning areas by dam, destruction of fish by overflow basin, pollution and predation; historical account of life history study.

Clark, G. H.

1929b. Sacramento-San Joaquin salmon (*Oncorhynchus tshawytscha*) fishery of California. Calif. Div. Fish and Game, Fish Bull. 17, 73 p., 32 figs., 22 tbls.

Results of three-part study initiated in 1927 to bring light to causes of acknowledged depletion; early investigations, history and statistical review of fishery; 1872 beginning of artificial propagation attempts, establishment of hatchery system, introduction into exotic areas; history of legislation; effects of water supply, prices, depletion; individual stream spawning runs, time and beds; fish ladders and other aids, barriers and obstructions; scale samples, age determination, maturity, age class, sex and types; concludes that depletion evident; decrease in total catch and egg take; overfishing, dam obstruction, overflow basins, predators, pollution, spearing on beds as causes of depletion; obstruction reduced spawning area 80%; fish ladders and lifts not successful over high dams; 50% mature at four years.

Scofield, N. B.

1929. The status of salmon in California. Calif. Fish and Game, vol. 15, no. 1, p. 13-18.

Contributory factors of decrease; objects of legislation.

Whitehead, S. S.

1929. Salmon. *In* The commercial fish catch of California for the years 1926-1927. Calif. Div. Fish and Game, Fish Bull. 15, p. 29-31, 2 figs.

Catch composition and trends by district.

Clark, G. H.

1930a. Salmon. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 40-47, 9 figs.

History of fishery by districts, catch composition, controversies regarding seasons; notes decreasing catch, depletion of Sacramento River run.

Clark, G. H.

1930b. Salmon spawning in drainage canals in the San Joaquin Valley. Calif. Fish and Game, vol. 16, no. 3, p. 270.

Results of December 1929 studies at Newman; condition of fish, nature habitat; concludes that fish spawn in canals.

Snyder, J. O.

1931. Salmon of the Klamath River, California. Calif. Div. Fish and Game, Fish Bull. 34, 130 p., 44 figs., 77 tbls.

General characteristics of kings, distinction between species; spring migration, relation between water height and summer migration, condition of water, fan at river mouth, long fast of migration, coloration changes, sex ratio, average weight and size increase; notes that king summer migration accompanied by steelhead beginning in July, reaching August maximum, gradual September decline; age at maturity, age composition of catch; seaward emigration, population composition, scale structure; marking and recovery program, ocean tagging; Indian, sports and commercial fishing methods; river obstructions; depletion, district catch 1916-1928; ocean catch analysis at Klamath, Monterey, Ft. Bragg,

Noyo areas; artificial propagation; concludes that indigenous Klamath River kings differ in size and certain anatomical characteristics from Sacramento River population; summer run only one of commercial importance; average size and weight increase as season progresses; varied time of immigration; homing instinct barrier to dispersal; future high dam construction cause of possible extinction; maturity at two-six years; apparent and alarming rate of depletion and artificial propagation not only answer; deleterious effect of gill netting at river mouth; ineffectiveness of week-end closed period during season; long-distance ocean migration.

Snyder, J. O.
1934. Klamath River spawning conditions in 1932. Calif. Fish and Game, vol. 20, no. 1, p. 70-72.
Depth, width, composition of beds; numbers spawning, mortality, hatchery operations.

Snyder, J. O.
1936. Notes on the 1930 catch of king salmon in Klamath River. Calif. Fish and Game, vol. 22, no. 2, p. 138-139, 1 tbl.
Records unusual departure from normal size and age representation; percentage of adult and grilse; possible explanation.

Calderwood, W. L.
1937. Homing instinct in salmon. *Salmon and Trout Magazine*, no. 88, p. 207-213.
Answer to skepticism expressed by Huntsman (1937a, b) on homing principle and separate races theory; notes evidence of races and homing; possible difference in interpretations; experiments in England, marking and recovery; Danish experiments; concludes validity of homing instinct theory and that Huntsman's opposition must overcome half a century's accumulation of evidence to be acceptable.
See Huntsman (1937a) for other articles in controversy.

Davidson, F. A.
1937. "Migration" and "homing" of Pacific salmon. *Science*, vol. 86, no. 2220, p. 55-56.
Notes evidence from British Columbia and Alaska experiments in answer to Huntsman (1937a); parent stream gradient influence, catch records, marking and recovery; results of practical conservation application of homing principle; concludes that *Oncorhynchus* migrate to sea far beyond zone of influence of parent stream, mature and return to parent stream to spawn; homing principle sound in theory and practice.
See Huntsman (1937a) for other articles in controversy.

Huntsman, A. G.
1937a. "Migration" and "homing" of salmon. *Science*, vol. 85, no. 2204, p. 313-314.
First serious opposition to views regarding existence of homing instinct; notes activities of Atlantic salmon (*Salmo salar*) generally considered more closely allied to Pacific steelhead than Pacific salmon; river zone of influence; concludes pointlessness of speaking of "homing instinct" without rigid observational proof.
Note: for articles in controversy that followed, see Calderwood (1937), Dahl (1939), Davidson (1937), Huntsman (1937b, c and 1938), *Pacific Fisherman* (1937a, b, c), Rich (1937a, b) and Shapovalov (1940b).

Huntsman, A. G.
1937b. "Races" and "homing" of salmon. *Science*, vol. 85, no. 2216, p. 582-583.
Answers Rich (1937a); challenges validity of "local races" theory without evidence gathered by rigid experiments; effect of heredity and environment on racial distinction.
See Huntsman (1937a) for other articles in controversy.

Nidever, H. B.
1937. Salmon. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 49-54, 3 figs.
History and methods of fishery from Broderick cannery inception in 1864; grounds, regional landings 1916-1935, demand, price.

Rich, W. H.
1937a. "Homing" of Pacific salmon. *Science*, vol. 85, no. 2211, p. 477-478.
Partial answer to Huntsman (1937a); notes Pacific coast experiments with *Oncorhynchus*, river influence, important practical conservation problems linked with theory.
See Huntsman (1937a) for other articles in controversy.

Rich, W. H.
1937b. "Races" and "homing" of Pacific salmon. *Science*, vol. 86, no. 2223, p. 122.
Answer to Huntsman (1937b); application of "race" to local distinguishable populations regardless of source of differences; emphasizes validity of homing instinct theory; notes that type of evidence required by Huntsman impossible to obtain and that without homing of salmon, local races impossible.
See Huntsman (1937a) for other articles in controversy.

Taft, A. C.
1937. Marked silver salmon from Waddell Creek caught near Ft. Bragg. Calif. Fish and Game, vol. 23, no. 2, p. 177-178.
Records 1936 appearance of specimen in Noyo receiving plant; scale measurement, type of marking, distance traveled; notes as first evidence of movement.

Brown, M. W.
1938. The salmon migration in the Shasta River (1930-1934). Calif. Fish and Game, vol. 24, no. 1, p. 61-65, 6 figs., 1 tbl.
Preliminary account of general salmon investigation; census taking methods, nature of migrations.

Clark, G. H.
1938. The 1938 salmon catch. *Calif. Conservationist*, vol. 3, no. 10, p. 1, 22.
Preliminary report; poundage by area, yearly fluctuations, spawning stream conditions, effect of pollution and impassable dams.
See Clark (1939) for final report.

Davidson, F. A. and S. J. Hutchinson
1938. The geographical distribution and environmental limitations of the Pacific salmon (*Genus Oncorhynchus*). U. S. Bur. Fish., Bull. no. 26, vol. 48, p. 667-692, 9 figs., 2 tbls.
General description and habits, native and foreign distribution; degree of abundance, limiting factors, annual surface temperature, subsurface temperature and salinity; concludes that distribution almost entirely confined to temperate water of north Pacific; environmental components of areas where natural runs established similar to native ranges; no ocean region able to support as well as north Pacific.

Huntsman, A. G.
1938a. Sea behaviour in salmon. *Salmon and Trout Magazine*, no. 90, p. 24-28.
Reply to Calderwood (1937); various countries' experiments and interpretations.
See Huntsman (1937a) for other articles in controversy.

Huntsman, A. G.
1938b. "Spawning urge," "homing instinct," and "waiting" in salmon returns. *Nature*, vol. 41, no. 3566, p. 421-422.
Recounts experiments at Apple River, Bay of Fundy; marking, recovery in two branches of river, effect of water conditions; concludes no homing instinct operative, waiting not in agreement with facts.
See Huntsman (1937a) for other articles in controversy.

Taft, A. C.
1938. King salmon. *Calif. Conservationist*, vol. 3, no. 1, p. 1-2, 1 fig.
Report on decrease in numbers and causes; dam construction, fishways, counts.

Clark, G. H.
1939. The 1938 salmon catch. Calif. Fish and Game, vol. 25, no. 1, p. 43-45, 1 fig.
Duplication of Clark (1938) with augmented total catch figures added.

Dahl, Knut

1939. Homing instinct in salmon. *Salmon and Trout Magazine*, no. 94, p. 19-26, 1 fig.

Comment on Huntsman (1937a, 1938) and frailness of objections; notes circumstantial, substantial and absolute evidence from England, Russia, Norway, United States, Canada experiments; emphasizes validity of homing theory.

Shapovalov, Leo and Wm. Berrian

1939. An experiment in hatching silver salmon (*Oncorhynchus kisutch*) eggs in gravel. Amer. Fish. Soc., Trans., vol. 69, p. 135-140, 3 tbls.

Report of experiment at Big Creek Hatchery with gravel and controlled hatchery basket lots; methods and control; temperature and hatch, emergence period, effect of silt, mortality, survival of both lots; concludes that silt carried by unusually severe floods smothers many eggs.

Vestal, E. H.

1939. Food habits of the American merganser in the south fork of the Eel River. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 39-24, 26 p., 4 figs. (Typewritten)

Habitat, species description, characteristics; migration of fish, relationship to feeding habits of ducks; concludes that large take of eggs in winter and fall consists only of eggs cast up by salmon, two-thirds of which opaque and constitute natural spawning loss; late winter and spring predation on emigrant young fish results in no apparent scarcity; presence of Benbow Dam backs up fish below it and concurrent concentration of mergansers.

Clark, G. H.

1940. California salmon catch records. Calif. Fish and Game, vol. 26, no. 1, p. 49-66, 9 figs., 44 tbls.

Presentation of scattered records of California commercial catch and summary of conservation laws; history of industry, gear, comparison of ocean and river fishing.

Hanson, H. A., O. R. Smith and P. R. Needham

1940. An investigation of fish-salvage problems in relation to Shasta Dam. U. S. Bur. Fish., Spec. Sci. Rept., no. 10, 200 p., 23 figs., 20 tbls., Appendix A-E with 25 tbls., 2 folded maps.

Preliminary report of biological and engineering investigations begun in July 1938 to ascertain size and composition of runs in upper river and to determine best means of preserving runs cut off from spawning grounds by dam construction; effect of dam operation, water utilization, outline of species biology; trapping, water temperature, truck and hauling problems; salvage methods by hatchery and natural propagation; size and value of fishery; size and time of run, counts at Redding, scrap species, length and weight of migrants, sex and age ratio, size of nests, fecundity, seaward migration; stream description and survey data from main river and tributaries; salvage plans for different areas, diversions, hatchery and holding ponds, run-off water and standby supply, stream improvement, artificial propagation, pollution problems, temperatures, flood conditions; concludes $95,000 calculated return to commercial fishermen annually, estimated 1939 run of 27,000 kings, 118 steelhead, 114 brown trout; length range from 16.5 to 44 inches, average weight of 18 pounds, 47.5% males and 52.5% females; average number of eggs at 6,790; two distinct migrations during April, May and June and during September, October and November; Stillwater, Battle, Mill and Deer Creeks only salvage possibilities; no effective screens on gravity or pump diversions in 19 drainages investigated; lack of water makes ladders inoperable; occasional lethal concentrations of toxic agents from copper pollution of mine drainages; recommendation before and after completion of Shasta Dam, p. iv-vi.

See Needham, Smith and Hanson (1940), and Needham, Hanson and Parker (1943) for continuation of investigation.

Hatton, S. R.

1940. Progress report on Central Valley fisheries investigation, 1939. Calif. Fish and Game, vol. 26, no. 4, p. 335-373, 6 figs., 14 tbls., Appendix A-C.

Partial results of biological survey to determine effect on fish population of Central Valley Project; scope of investigation; migration numbers on daily and seasonal basis, size, spawning areas; notes insufficient water for normal migration; unscreened diversions, pumps and flood gates; pollution.

See Hatton and Clark (1942).

Needham, P. R., O. R. Smith and H. A. Hanson

1940. Salmon salvage problems in relation to Shasta Dam, California, and notes on the biology of the Sacramento River salmon. Amer. Fish. Soc., Trans., vol. 70, p. 50-69, 2 figs., 4 tbls.

Report of investigation into practicability of salvage plans similar to those at Grand Coulee Dam; size and time of upstream migration, length and weight of migrants, sex ratio, fecundity, seaward migration, temperature causing high mortality; examination and condition of all tributaries for suitability for transfer of run passing Redding; effect of copper pollution; proposed rack barriers, traps, lifts, hatchery, tank truck operations; notes impracticality of constructing fish ladders because of dam height and inability of young downstream migrants safely to pass; notes absence of effective screens and inoperable character of ladders in tributaries; concludes that estimated 27,000 total annual run would be blocked by dam construction; distinct spring and fall run; calulated 7,000 eggs per female; lethal potentialities of copper pollution from abandoned mines.

Note: condensation of parts of preliminary report—Hanson, Smith and Needham (1940)—and presentation of additional material.

See Needham, Hanson and Parker (1943) for supplementary report.

Shapovalov, Leo

1940a. Some calculations regarding the natural spawning of king salmon in the south fork of the Eel River above Benbow Dam, season of 1938-39. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-2, 10 p., 4 tbls. (Typewritten)

Marking, recovery and counting operations, total numbers counted, egg number estimates, migration pattern.

Shapovalov, Leo

1940b. The homing instinct in trout and salmon. Sixth Pacific Sci. Cong., Proc., vol. 3, p. 317-322.

Attempt to clarify issues in homing and straying controversy; brief review of Waddell and Scott Creeks and Klamath River experiments; effect of river zones of influence, relationship between spawning migrations and chemical and physical conditions; concludes that homing true and excellent example of instinct; anadromous forms of trout and salmon return as spawning adults to streams left as young whether naturally or artificially propagated; instinct developed less strongly in some species, varieties, races or subspecies.

See Huntsman (1937a) for other articles in controversy.

Hatton, S. R. and G. H. Clark

1942. A second progress report on the Central Valley fisheries. Calif. Fish and Game, vol. 28, no. 2, p. 116-123, 1 fig., 4 tbls.

Continuation of analysis of effect of Central Valley irrigation construction; number, size, composition of migration.

See Hatton (1940).

Woodhull, Chester and W. A. Dill

1942. The possibilities of increasing and maintaining a run of salmon *(Oncorhynchus tshawytscha)* in the Kings River, California. Calif. Div. Fish and Game, Bur. Fish. Cons., Adm. Rept. 42-26, 32 p., 17 figs., 2 tbls. (Typewritten)

Report on augmenting San Joaquin River run by hatching eggs and planting young; description of river and fishery possibilities, weirs, diversions, potential spawning areas, bottomfood, flow and fluctuations; planting suggestions without recommendations for carrying out; concludes existence of unfavorable conditions for natural run or artificial supplementation; past history and future outlook argue against conversion into permanent salmon stream.

Clark, G. H.
1943. Salmon at Friant Dam—1942. Calif. Fish and Game, vol. 29, no. 3, p. 90-91, 1 fig.
Effect of dam on spawning run, condition and behavior of population, description of downstream area; notes that Friant not prohibitive to spawning and that salmon drop back downstream for spawning purposes.

Needham, P. R., H. A. Hanson and L. P. Parker
1943. Supplementary report on investigation of fish-salvage problems in relation to Shasta Dam. U. S. Fish and Wildlife Ser., Spec. Sci. Rept. no. 26, 52 p., 2 figs., 17 tbls.
Continuation of biological investigation in upper Sacramento River valley and status of Shasta Salmon Salvage Project; history of project, construction of dam, effect of dam operation, water utilization; status of salvage facilities at various locations; tank truck, rack, trap and ladder operations; fish counts, spawning observations, utilization of spawning areas, seaward migrants, water temperature; notes that Battle and Deer Creeks only streams below dam with salvage possibilities; transfer of marked specimens; concludes that 60,000 annual run passing Redding; successful 1942 spawn in main river below Keswick Dam; successful transfer from Sacramento River to Deer Creek.

Shaw, P. A. and J. A. Maga
1943. The effect of mining silt on yield of fry from salmon spawning beds. Calif. Fish and Game, vol. 29, no. 1, p. 29-41, 6 figs., 6 tbls.
Results of experimental study at Brookdale Hatchery to aid in settling controversy and establish factual basis for enforcement action; construction of beds, addition of silt, fry yield; concluded that mining silt deposited during early or later incubation period serious menace to natural propagation.

Parker, L. P. and H. A. Hanson
1944. Experiments on transfer of adult salmon into Deer Creek, California. J. Wild. Man., vol. 8, no. 3, p. 192-198, 1 fig., 3 tbls.
Report of one part of Shasta Dam salvage operations, designed to determine whether specimens transferred would suitably distribute and survive to spawn naturally; methods and materials; pre-spawning observations, spawn, recovery of marked specimens, pre-spawning mortality, length, sex; concludes suitable distribution and subsequent natural spawn following transfer from Sacramento River.

McLean, D. D.
1945. Late spring spawning of Chinook salmon *(Oncorhynchus tshawytscha)*. Calif. Fish and Game, vol. 31, no. 4, p. 211.
Notes May occurrence of spawning individuals on Sacramento River at Redding; weight, condition.

Van Cleve, Richard
1945. A preliminary report on the fishery resources of California in relation to the Central Valley Project. Calif. Fish and Game, vol. 31, no. 2, p. 35-52, 3 figs., 4 tbls.
Habits, environmental requirements, spawning population estimate, value of commercial and sport fishery; effect of canals, stream crossings, screens, fish ladders.

Wales, J. H.
1945. Klamath River—stranding of salmonid fingerlings. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 43-5, 5 p. (Typewritten)
Report of experiment to determine seriousness of stranding; downstream migration of fish liberated in Fall Creek; predation by birds, value-harm ratio.

Fry, D. H., Jr.
1949. Salmon. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 37-49, 6 figs, 1 tbl.
Range, importance of king and silver; Indian fishing methods; history, gear and methods of ocean and river fisheries; canning, total landings, 1916-1947; heaviest ocean and river runs and season closures.

Moffett, J. W.
1949. The first four years of king salmon maintenance below Shasta Dam, Sacramento River, California. Calif. Fish and Game, vol. 35, no. 2, p. 77-102, 4 figs., 9 tbls.
Operation of maintenance plan, handling of population, ecological changes, reservoir operation, fish transfer; concludes that loss of spawning grounds above dam compensated for by improved conditions below it.

Rich, W. H. and others
1949. Report of the Fish and Wildlife Service, a preliminary report on the fishery resources of California with relation to the Central Valley Project (Revised). *In* U. S. Bureau of Reclamation, Central Valley Basin. Sen. Doc. 113, 81st Cong., 1st Sess., p. 249-260, 2 figs., 4 tbls.
Difficulties encountered by proposed dam construction; Bonneville, Grand Coulee and Shasta costs devoted to fish protection programs and devices; Table Mountain Dam threat to protection offered by Shasta system; annual value of resource estimated at $1,300,000; general fishery protective principles, life history notes in relation to monthly activities, requirements for adequate protection, value of valley fish resources, major salmon streams affected by projects, with necessary minimum flows; list of impassable dams; problems raised by Delta Cross Channel, Mendota Pool, salt water barrier, lateral canals; salmon refuges; concludes that 250,000 spawn in Sacramento-San Joaquin system, 40% above site of proposed Table Mountain Dam; direct losses from Dam of $520,000 annually; recommends prohibiting salmon spearing in all State streams; re-examination of economic justification for Table Mountain Dam; setting of minimum flow below Friant Dam to save annual 15,000 spawning population and permit full potentialities of spawning area.

Croker, R. S.
1950. Status of the California salmon. *Tyee Tales*, vol. 8, nos. 9-10, p. 3-6.
Summary of resource status and account of conservation measures; catch record history, fishing methods and areas; history of river and stream sections, regulations, stream maintenance and improvement, artificial propagation, hatchery operation and contributions.

Wales, J. H.
1950. Management of king salmon spawning in the Klamath River, Siskiyou County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-50, 12 p., 4 figs., 3 tbls. (Typewritten)
Effects of dams, spawning facilities' capacity; spawning areas and conditions.

Fry, D. H. Jr. and E. P. Hughes
1951. The California salmon troll fishery. *In* Pac. Mar. Fish. Comm., Bull. 2, p. 7-42, 18 figs., 9 tbls.
History and methods of fishery; description of districts and ports, ocean landings by regions 1916-1949, separation of king and silver catches; tagging operations, areas, numbers, recoveries; commercial catch sampling, length-weight frequencies; concludes that silvers comprise 90% ocean catch; Sacramento-San Joaquin fish dominate central and northern catch; greatest silver recoveries in Oregon streams; 25-inch minimum size limit as effective as Oregon and Washington closed season lasting to June 14th.

Loeber, T. S.
1951. A report of an investigation of the temperature and salinity relationships of striped bass (*Roccus saxatilis*) and salmon (*Oncorhynchus tshawytscha*) in connection with the Reber Plan. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-27, 40 p., 25 figs., 2 tbls. (Typewritten)
Effect of diet on temperature relationships, comparative iodine numbers and temperature tolerance of field and laboratory specimens, maximum temperature toleration, shock phenomenon.

Shapovalov, Leo
1951. King and silver. Calif. Div. Fish and Game, Public Information Pamphlet, 5 p. (Processed)
Popular article written to assist in identity; official and common names, anadromous habits, spawning, egg development; homing instinct

experiments in California; distinguishing characteristics by specie and sex, contrast with steelhead.

Wales, J. H.
1951a. The decline of the Shasta River king salmon run. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-18, 82 p., 17 figs. (Typewritten)
Dramatic decline in Klamath tributary; geological history of drainage, description of area; history of Klamathon counts, 1925-1950; predation, disease, pollution, adverse water flows and temperatures, downstream and upstream migrants; concludes that commercial fishing most important factor; Copco Dam and Shasta Valley irrigation two other important predisposing factors.

Wales, J. H.
1951b. Efficiency of king salmon spawning in Fall Creek, Siskiyou County; progress report for 1950-51. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-34, 55 p., 13 figs., 10 tbls. (Typewritten)
Description of Klamath River tributary under control conditions, drainage and area; description and operation of counting station; physical data, stream flow velocity, predation, spawning migration chronology, artificial spawning, natural spawning activity, seaward migration of fingerlings, lamprey scars; length, weight of spawning specimens, egg counts, spawning and incubation success, parasites and disease; concludes that 2,567,250 eggs contained in 750 females; computed 174,867 fingerlings on downstream migration; 6.8% natural spawning efficiency; 35.3% artificial spawning efficiency, lower than usual because of overripe egg condition; salmon salvage operation needed in upper river above Klamathon.
Note: appendix, p. 45-51, contains comparison of Fall Creek and British Columbia investigation on sockeye, pink and coho.

Cramer, F. K. and D. F. Hammack
1952. Salmon rescue at Deer Creek, California. U. S. Fish and Wildlife Ser., Spec. Sci. Rept., Fisheries 67, 16p., 1 fig., 7 tbls.
Part of Shasta Salmon Maintenance Program; description of area, transplanting of specimens from Sacramento River, yearly counts at weir, distribution of adults, spawning observations, downstream migration, temperature and flow; notes that low flows, high water temperatures, poorly screened irrigation ditches and barrier of Stanford-Vina Irrigation Company Dam during low water periods prevent realization of full potentiality.

Fry, D. H., Jr. and E. P. Hughes
1952. A sampling program for recovery of marked king and silver salmon. Calif. Fish and Game, vol. 38, no. 4, p. 535-540, 2 figs.
Program purpose, plans for recovery, time and place of sampling, equipment, procedures.
See Hallock, Warner and Fry (1952).

Murphy, G. I.
1952. An analysis of silver salmon counts at Benbow Dam, South Fork of Eel River, California. Calif. Fish and Game, vol. 38, no. 1, p. 105-112, 3 tbls.
Continuation of long-range project; count details for 1938-39 through 1950-51 seasons segregated as grilse, male and female; methods, interpretations; population size fluctuation factors, total egg deposition; runoff during spawning, late incubation, hatching and dry seasons.

Hallock, R. J., G. H. Warner, and D. H. Fry, Jr.
1952. California's part in a three-state salmon fingerling marking program. Calif. Fish and Game, vol. 38, no. 3, p. 301-332, 12 figs., 4 tbls.
Report of first two years of program of Pacific Marine Fisheries Commission; history, problems, methods; tagging and marking experiments; comparison between king and silver, capture of wild fingerlings; construction, placement and operational success of seines and fyke nets; fin clipping at Coleman Fishing Station and Prairie Creek Hatchery.
See Fry and Hughes (1952).

Baldwin, W. J.
1954. Underwater explosions not harmful to salmon. Calif. Fish and Game, vol. 40, no. 1, p. 77.
Notes results of 1953 submarine geophysical operations.

Coots, M. H.
1954. Efficiency of king salmon spawning in Fall Creek, Siskiyou County; progress report for 1953-54. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 54-7, 29 p., 9 figs., 6 tbls. (Typewritten)
Experiment in control stream section; description of area, species present; counting methods; downstream migration, development of young, marking; concludes 36.5% spawning efficiency.

Wales, J. H. and Millard Coots
1954. Efficiency of chinook salmon spawning in Fall Creek, California. Amer. Fish. Soc., Trans., vol. 84, p. 137-194, 2 figs., 6 tbls.
Report of 1950-1954 investigation of conditions following 1948 closure of hatchery and subsequent spawning wherever able in tributaries and main river below Copco dam; position of artificial and natural propagation proponents; earlier assumptions regarding poor natural fertilization, need for hatchery supplementation, later awareness of population's ability to maintain numbers without artificial additions and with heavy fishing; phenomenon of resiliency of genus, work on *gorbuscha*, *keta* and *nerka* in British Columbia, generally same mortality pattern of species; description of creek as last enterable Klamath River tributary, not typically *tshawytscha* spawning grounds but steelhead stream which salmon forced to use; important 1.15 mile section between mouth and power plant, typical physiography compensated for by relatively uniform flow of suitable quality water; weir and trap for counting; numbers spawning, eggs deposited, seaward migrants; concludes considerable variation in efficiency, no causes assigned; indications of inverse correlation between size of floods during incubation and efficiency of spawning.
Note: appears as Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 54-11 (1954).

Coots, M. H.
1955a. Klamath River 1954 king salmon count, Klamathon racks, Siskiyou County, and some notes on marked king salmon recoveries in the upper Klamath River. Calif, Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-1, 17 p., 4 figs., 8 tbls. (Typewritten)
Methods and materials of count, hatchery plants, spawning area utilization, marking and recovery.

Coots, M. H.
1955b. Some notes on hatchery and marked wild king salmon fingerlings in Fall Creek, Siskiyou County. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-13, 8 p., 2 tbls. (Typewritten)
Methods and materials; downstream migrants, comparative survival, numbers recovered, behavior, feeding.

Gangmark, H. A. and R. D. Broad
1955. Experimental hatching of king salmon in Mill Creek, a tributary of the Sacramento River. Calif. Fish and Game, vol. 41, no. 3, p. 233-240, 6 figs., 2 tbls.
Results of one phase of 1952 studies to investigate freshwater influences on survival rates near southernmost spawning range limit; description of study area, methods, planting of one hundred sacks of eggs, water flow and temperature, influence of position; notes inconclusive direct relationship between floods and egg mortality.
See Gangmark and Broad (1956).

Broad, R. D. and H. A. Gangmark
1956. Establishment of a controlled-flow area and construction of king salmon spawning pens at Mill Creek, California. Prog. Fish-Culturist, vol. 18, no. 3, p. 131-134, 3 figs.
Description of channel, stream improvements; spawning riffle construction for controlled observations, pen construction; fry emergence percentage, causes of natural spawning failures.
See Gangmark and Broad (1955).

Gangmark, H. A. and R. D. Broad
1956. Further observations on stream survival of king salmon spawn. Calif. Fish and Game, vol 42, no. 1, p. 37-49, 4 figs., 4 tbls.
Continuation of study reported in Gangmark and Broad (1955), experimental area; description of controlled flow channel; effect of floods, erosion, rate of flow.

Gibbs, E. D.
1956. A report on the king salmon, *Oncorhynchus tshawytscha*, in the upper Trinity River, 1955. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-10, 14 p., 1 fig., 6 tbls. (Processed)
Survey of fishery to determine aspects needed to maintain and manage anadromous species in view of power development plans, with particular reference to portion of run utilizing area above Lewiston Dam; tagging methods; sex, size, spawning success, area of recovery, date, redd counts, redd utilization; concludes that 47% of run spawns above dam site.

McCully, Howard
1956. An undescribed type of migration in king salmon, *Oncorhynchus tshawytscha* (Walbaum). Calif. Fish and Game, vol. 42, no. 3, p. 189-198, 1 fig., 4 tbls.
Records ocean recovery of specimen not proceeding upstream for spawning purposes; downstream recoveries of tagged specimens, size of movement, sex and maturity, salinity, rate of movement, season, destination; concludes that fall 1950-1953 many adult specimens returned downstream 80 miles or more to brackish waters.

Weber, G. H.
1956. North coastal salmon carcass recovery work—1955. 60 p., 4 figs., 19 tbls. (Typewritten) (Available at Calif. Dept. Fish and Game Library, Sacramento, Calif.)
Report of portions of Klamath, Trinity, Mad and Smith Rivers and Prairie Creek spawning area surveys, October 1955-January 1956; spawning stock survey summary; release and marking information; brief description of streams; recommendations for improvements; estimated percentage of recovery, numbers recovered, calculated population.

Coots, M. H.
1957a. Klamath River 1955 king salmon count, Klamathon racks, Siskiyou County, and some notes on marked king salmon recoveries in the upper Klamath River. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-3, 13 p., 3 figs., 7 tbls. (Processed)
Spawning run composition, success, character of stream bottom, effect of December floods, numbers of marked specimens.

Coots, M. H.
1957b. Shasta River, Siskiyou County, 1955 king salmon count, and some notes on the 1956 run. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-5, 6 p., 3 figs., 1 tbl. (Processed)
Extent of run, carcass recovery work, principal spawning areas, results of serious fires in watershed.

Coots, M. H.
1957c. The spawning efficiency of king salmon (*Oncorhynchus tshawytscha*) in Fall Creek, Siskiyou County; 1954-55 investigations. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-1, 15 p., 4 figs., 6 tbls. (Processed).
Fifth in series on controlled stream section 185 miles from ocean; description of stream, species present, count of spawners, trapping and counting downstream migrants, predation, utilization of redds by subsequent silver salmon and steelhead spawners.

Hallock, R. J., and W. F. VanWoert
1957. 1956 fall-run king salmon, *Oncorhynchus tshawytscha*, population estimates for the Sacramento River and tributaries north of Hamilton City. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-14, 9 p., 1 fig., 4 tbls. (Processed).
Description and count of three peak spring periods; physical characteristic of stream section, turbidity, volume of flow, aerial redd counts; estimates 123,463 total fall run, 93,157 spawning in main stream, 30,306 in nineteen tributaries.

Merkel, T. J.
1957. Food habits of the king salmon, *Oncorhynchus tshawytscha* (Walbaum), in the vicinity of San Francisco, California. Calif. Fish and Game, vol. 43, no. 4, p. 249-270, 4 figs., 8 tbls.

Analysis of 1,004 stomach contents of specimens caught by trolling; methods and materials; fish and invertebrates in diet, difference in food habits according to size, difference in amounts eaten; concludes that anchovy constitutes 29.1% of total food consumed, rockfish 22.5%, euphausiids 14.9%, Pacific herring 12.7%, squid 9.3%; seasonal changes in diet composition related in some cases to shifts in locality of capture; size not factor in food habits.

Outdoor California
1957. Silver salmon planting tests seek to restore declining coastal runs. Vol. 17, no. 4, p. 12-13, 1 fig.

Report of first year of experimental program; spawning run count history, spawning area requirements, stream damage by logging practices, hatchery facilities.

Robertson, O. H.
1957. Survival of precociously mature king salmon male parr (*Oncorhynchus tshawytscha* Juv.) after spawning. Calif. Fish and Game, vol. 43, no. 2, p. 119-130, 4 figs., 4 tbls.

Results of experiment designed as approach to nature of post-spawning study; observations on specimens at Prairie Creek Hatchery; description, experiment plan, fertility, histology of testes; concludes that age deciding factor in determining death or survival after spawning.

Croker, R. S.
1958. The salmon story—California 1958. Calif. Dept. Fish and Game, 17 p. (Processed) (Presented to Calif. Assembly Interim Committee on Fish and Game hearing, Humboldt State Coll., Arcata, January 27, 1958.)

Origin of problems, description of research and management program; report prompted by two successive poor spawning years coupled with combined sport and commercial landings drop to 200,000 fish below forty-one year average; outline of Department's responsibilities, factors causing plight; recommendations for improvements, new techniques, changes in legislation, pollution control.

Note: condensation appears in *Outdoor California*, vol. 19, no. 3, p. 1, 4-7 (1958).

Westgate, John
1958. The relationship between flow and usable salmon spawning gravel, Cosumnes River, 1956. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 58-2, 8 p., 2 figs., 2 tbls. (Processed)

Description of river and study area; location, quantity and quality of spawning areas; optimum, minimum and maximum flow; concludes that river area high in potentiality as spawning stream; sustained flows of 200-375 c.f.s. from October to December adequate for utilization.

TROUT

Steelhead rainbow *Salmo gairdneri gairdneri*
Cutthroat *Salmo clarki*

Stone, Livingston
1882. Report of operations at the United States trout ponds, McCloud River, California during the season of 1879. U. S. Comm. Fish and Fisheries, Report for 1879, Part VII, p. 715-720.
Description, location, establishment, operation of hatchery on George Crook's Creek.

Stone, Livingston
1885. Report of operations at the United States trout-breeding station on the McCloud River, California, during the year 1883. U. S. Comm. Fish and Fisheries, Report for 1883, Part XI, p. 1001-1006, 2 tbls.
Effect of unusually cold weather; notes peculiar feeding methods wholly unlike eastern populations.

Evermann, B. W. and H. C. Bryant
1919. California trout. Calif. Fish and Game, vol. 5, no. 3, p. 105-135, 16 figs.
Descriptions, field identification with habits, habitat, distribution.

Snyder, J. O.
1921. Steelheads caught at sea off the coast near Fort Bragg. Calif. Fish and Game, vol. 7, no. 1, p. 9-11, 2 figs.
Description of 16 specimens; spawning migrations and behavior in Klamath River.

Snyder, J. O.
1925. The half-pounder of Eel River, a steelhead trout. Calif. Fish and Game, vol. 11, no. 2, p. 49-55, 4 figs.
Results of a brief study to determine answer to rainbow-steelhead controversy; description, migrations, scale samples; need for protection of young; concludes that steelhead and rainbow identical.

California State Chamber of Commerce. Conservation Department
1930. Report of the Klamath River study committee of the California State Chamber of Commerce. 29 p. (Processed)
Affect of damming on angling; sports fishery importance, methods, bait; fish distribution, growth, food, stocking; notes decline in steelhead runs; recommends intensive hatchery operations to restock and possibility of landlocked fishery "for the many."

Davis, H. S., P. R. Needham and A. C. Taft
1933 California trout investigations; first annual report for the fiscal year, July 1, 1932 to June 30, 1933. U. S. Bur. Fisheries Report to Calif. Div. Fish and Game, 55 p., 17 photographs. (Typewritten) (Available at Calif. Dept. Fish and Game Library, Sacramento, California)
Tentative summarization of field work; description and operation of Yosemite and Coastal Stream projects, Truckee River and Upper Angora Lake marking experiments, Hot Creek experimental pond and San Diego Reservoir study; angling pressure, carrying capacity of streams; effects of irrigation and power diversions, partial closure to fishing; unknown effect of homing instinct; counting and marking, bottom foods collections, seasonal fluctuations and utilization of natural foods, practicability of food introduction.
See Needham and Taft (1936)

Needham, P. R.
1933. The California trout investigations. Calif. Fish and Game, vol. 19, no. 2, p. 113-122, 9 figs.
Progress report on program of trout and environment; areas and subjects for study; food and shelter requirements, effect of hazards and pollutants.

Snyder, J. O.
1933a. California trout. Calif. Fish and Game, vol. 19, no. 2, p. 81-112, 15 figs., 4 color pls.
Distribution and range, native and introduced species; description, habits, habitat, conservation and importance; scale readings, color, food; barriers to migration, artificial propagation and distribution, predators.
Note: see Wales (1957) p. 50-51, on extinct and invalid species.

Snyder, J. O.
1933b. A steelhead migration in Shasta River. Calif. Fish and Game, vol. 19, no. 4, p. 252-254, 1 fig., 1 tbl.
Methods of counting passing populations at mouth of river; date, time, and number of migration; water temperature and weather.

Taft, A. C.
1933. California steelhead trout problems. Calif. Fish and Game, vol. 19, no. 3, p. 192-199, 2 figs.
Notes gaps in knowledge of life history and characteristics; conditions of population, migrations, survival; creel checks; proposals to improve fishing; further restrictions and abundance.

Needham, P. R.
1934. Notes on the food of trout. Calif. Fish and Game, vol. 20, no. 2, p. 119-127, 8 figs., 3 tbls.
Brief review of stomach content analysis from specimens taken in Waddell Creek, Merced River, Hot Creek; dominant foods.

Needham, P. R. and A. C. Taft
1934. Observations of the spawning of steelhead trout. Amer. Fish. Soc., Trans., vol. 64, p. 332-338, 2 figs.
Brief presentation of data gathered incidentally to California Trout Investigations during spring 1933 at Waddell Creek; construction and description of pen and blind for controlled experiment under natural conditions; description of specimens, water depth and velocity over redd; pre-spawning female activity, fighting and driving away by males and stimulation of female; details of spawning act; post-spawning behavior; extent of completed redd, egg and pit numbers; concludes that presence of smaller males for participation, not predation; no opportunity for egg predation; slight possible damage by late spawners in same areas.
Note: first published account clearly describing actual spawning act of any salmonid.

Snyder, J. O.
1934. Water shortage in Santa Clara County. Calif. Fish and Game, vol. 20, no. 4, p. 390-391.
Notes plans to construct six large dams for reservoir purposes; adaptable stocking program to varying surface levels; affect on steelhead migration.

Taft, A. C.
1934. California steelhead experiments. Amer. Fish. Soc., Trans., vol. 64, p. 248-251.
Problems in management, differences between steelhead and rainbows; gradation in migratory habits largely limited by physical characteristic of lake and streams; variation in habits among types, overlapping characteristics, production of eggs for hatchery use; description and operation of experimental stations at Scott and Waddell Creeks; notes opinion that trout of rainbow series all definitely migratory and no sharp dividing line separating steelies from rainbow.

Needham, P. R.
1935. Natural food of trout. *Prog. Fish Culturist*, Memo I-131, no. 10, p. 1-12, 4 tbls.
General description of various foods present in trout waters, followed by details of stomach analyses as part of California Trout Investigations; concludes that caddiceflies comprise 50.5% total food of young steelhead of Waddell Creek with *Chironomidae* midges 36.3%.
Note: see p. 8-11 for discussion of California findings.

Needham, P. R. and A. C. Taft
1936. California trout investigations; second progress report for the period of July 1, 1933, to December 31, 1935. U. S. Bur. Fisheries Report to U. S. Commissioner of Fisheries and Calif. Div. Fish and Game, 58 p., 16 tbls. (Typewritten) (Available at Calif. Dept. Fish and Game Library, Sacramento, California)
Status of work in connection with major and minor projects reported in Davis, Needham and Taft (1933) and Convict Lake planting experi-

ment, Beaver Creek screening experiment; introduction of water-flea *(Daphnia magna)* and isopod crustacean *(Asellos communis)* as food; stream and lake surveys, planting, legal restrictions, physical and biological improvements, artificial propagation aids, description of study areas.

See Davis, Needham and Taft (1933).

Curtis, Brian

1937. A biological survey of Gibraltar Reservoir, Santa Ynez River System, Santa Barbara County, Los Padres National Forest, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 37-5, 23 p., 1 fig., 3 tbls. (Typewritten)

Result of investigation to determine possible causes of angler dissatisfaction and to suggest remedies; description of area, materials and methods; species present, suitability of conditions, catch records; age, growth rate, food, enemies, spawning condition, number of fish; fishery history, areas; recommends no black bass plantings; plants of steelhead; reduction of bluestoning; sustained catch record.

Needham, P. R.

1937. Quantitative and qualitative observations on fish foods in Waddell Creek Lagoon. Amer. Fish. Soc., Trans., vol. 69, p. 178-186, 5 tbls.

Report on one part of California Trout Investigation 1932-1934; methods and use of Ekman dredge and square-foot box; description of creek and lagoon, unstable environmental condition for fish-food organisms; temperature, fauna, seasonal availability of foods, abundance of bottom populations by weight, dominant animals, foods available to foods eaten; concludes calculation of 274 pounds per acre average annual crop; March highest poundage, November lowest; number per square meter not necessarily correlated with high poundage per acre; crustaceans as dominant food, *Gamarus confervicolis* constituting over 93% of steelhead food, *Exosphaeroma oregonensis* 4%; adaptability of brackish-water crustaceans to fresh water.

Shapovalov, Leo

1937. Experiments in hatching steelhead eggs in gravel. Calif. Fish and Game, vol. 23, no. 3, p. 208-214, 3 tbls.

Report of experiment at Big Creek Hatchery to determine effectiveness of natural spawning; method and procedure, eggs fertilized, depth of egg burial, length-weight at emergence, mortality; concludes that emergence percentage high and heaviest losses occur in fry stage.

Taft, A. C.

1937. Steelhead; they do return to native streams! *Calif. Conservationist*, vol. 2, no. 9, p. 1, 6, 2 figs.

Coastal stream investigation; trapping and marking specimens, number of returns; notes that each stream must be managed as separate unit.

Wales, J. H. and William Berrian

1937. The relative susceptibility of various strains of trout to furunculosis. Calif. Fish and Game, vol. 23, no. 2, p. 147-148.

Results of subjecting fingerlings to disease; mortality, course of disease; concludes that all strains susceptible.

Needham, P. R.

1938. Trout streams: conditions that determine their productivity and suggestions for stream and lake management. Comstock Publ. Co., 233 p., 74 figs.

Description of fish and streams; predators, parasites, food habits, preferences and distribution; propagation methods, stocking policies, stream improvement; discussion of trout names, planting tables, organization and operation of stream and lake survey crews.

Shapovalov, Leo

1938a. Recommendations for management of Marin Municipal Water District reservoir lakes during the fishing season of 1938. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 38-2, 5 p. (Typewritten)

Report requested upon declining fishery; physical characteristics, stocking; recommends no additional brown trout plants.

Shapovalov, Leo
1938b. Report on a preliminary survey of some streams in San Benito County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 38-13, 7 p., 2 figs. (Typewritten)
Investigation to determine suitability for planting; description of area; bottom, food, cover, spawning areas; falls, dams, diversions; recommends steelhead stocking.

Snyder, C. O.
1938. A study of the trout (*Salmo irideus* Gibbons) from Waddell Creek. Calif. Fish and Game, vol. 24, no. 4, p. 354-375, 9 figs., 4 tbls.
Results of one year's anglers' catch; description of creek, depletion factors, age and growth, sex representation, scale readings; concludes that growth more rapid in summer than in winter, males predominant, remain in stream one to three years prior to seaward migration.

Taft, A. C. and Leo Shapovalov
1938. Homing instinct and straying among steelhead trout *(Salmo gairdnerii)* and silver salmon *(Oncorphynchus kisutch)*. Calif. Fish and Game, vol. 24, no. 2, p. 118-125, 2 figs., 3 tbls.
Report of experiment in Scott and Waddell Creeks and Klamath River; markings, liberations; depletion factors; concludes that homing operates within river system and that continued fresh water influence not necessary; notes that experiment results contradict theory advanced by Huntsman (1937).

Wales, J. H.
1938. Mortality in young Eel River steelhead. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 38-10, 10 p. (Typewritten)
Investigation of July 1938 epidemic; water conditions, temperature, cover and shade, diseases; concludes that combination of high water temperature and lowered oxygen content reduced resistance to diseases.

Shapovalov, Leo
1940a. Report on brief survey of barriers and possible hatchery sites in Pfeiffer Redwoods State Park and immediate vicinity. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-8, 15 p., 5 figs. (Typewritten)
Field trip notes; water supply sources, flow, falls, temperature, barriers; stocking and management recommendations.

Shapovalov, Leo
1940b. Report on possibilities of utilization of Hinkley Creek, Santa Cruz County, for fish cultural and fish management purposes. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-18, 26 p., 2 figs., 1 tbl., Appendix A-B. (Typewritten)
Description of area and drainage basin, tributaries, flows, temperature, fishing possibilities.

Snyder, J. O.
1940. The trouts of California. Calif. Fish and Game, vol. 26, no. 2, p. 96-138, 32 figs., 4 color pls.
Distribution and relationship, native and introduced species, habits, habitat, scale readings, coloration, special senses, food preferences, barriers to migration, hatchery and propagation efforts.

Wales, J. H.
1941. Development of steelhead trout eggs. Calif. Fish and Game, vol. 27, no. 4, p. 250-260, 17 figs., 2 tbls.
Description of daily egg samples taken at Big Creek hatchery.

Shapovalov, Leo
1944a. Preliminary report of the fisheries of the Santa Ynez River system, Santa Barbara County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-14, 22 p., 3 tbls. (Typewritten)
Location and description of area, physiography, climate, vegetation, stream flow, development, dams and diversions; species present, predominantly steelhead with possible rainbow and crosses; spawning migration runs and areas, fishing, fish rescue, stocking history.

Shapovalov, Leo
1944b. Observations on regulated flows in the Russian River, October 10-13, 1944. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-21, 10 p., 1 tbl. (Typewritten)
Companion report to Shapovalov and Curtis (1944).

Shapovalov, Leo and Brian Curtis
1944. Observations on the streams of the Russian River system, October 10-13, 1944. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-20, 27 p., 5 figs. (Typewritten)
Joint field notes on effects of flow changes; streams, aquatic organisms, species.

Curtis, Brian
1945a. Conn Valley Dam: preliminary report no. 1. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-18, 4 p. (Typewritten)
Effect of dam construction, large drawdown, high water temperature, rough fish; description of area; poisoning possibilities, species present.

Curtis, Brian
1945b. Conn Valley Dam: preliminary report no. 2, Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-19, 6 p. (Typewritten)
Report of additional work, transcript of field notes; recommends spot poisoning, fish rescue.

Curtis, Brian
1945c. Fishery program for Conn Valley Reservoir, Napa County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-21, 10 p., 1 fig., 1 tbl. (Typewritten)
Condition at site, fate of steelhead run, game fish to be encouraged, control of rough fish; constant flow requirements; recommends planting steelhead or rainbow and if unsuccessful, then black bass; fishing closure 1946 and 1947.

Shapovalov, Leo
1945a. Observations on controlled flows in the Eel River, Lake and Mendocino Counties, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-26, 17 p., 3 tbls. (Typewritten)
Effect of fluctuations of releases from Scott Dam; importance of stream section between Scott Dam and Van Arsdale Reservoir, fish rescue, spawning areas, temperature records; recommends fishway or elevator over Scott Dam; maintenance of constant level.

Shapovalov, Leo
1945b. Report on relation to maintenance of fish resources of proposed dams and diversions in Santa Barbara County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-25, 11 p. (Typewritten)
Importance of Santa Ynez River as spawning and nursery grounds of largest southern California steelhead run, and as source of majority of game fish stocked in Santa Barbara, Ventura and San Luis Obispo Counties; proposed dam construction; size of run, rescue work; recommendations for fishery protection.

Wales, J. H.
1948a. Creel census—May 1, 1948, Klamath River, Siskiyou County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-13, 5 p. (Typewritten)
Fishing intensity, quality, success; size, length, weight of specimens; effect of immature specimens in catch.

Wales, J. H.
1948b. Creel census—May 1, 1948, Shasta River, Siskiyou County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-12, 3 p. (Typewritten)
Fishing intensity, quality, success; length group, size of specimens; first count following closure to angling for several years.

Wales, J. H.
1949. Creel census—May 1, 1949, Shasta River, Siskiyou County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-24, 3 p., 2 tbls. (Typewritten)
Weather and water conditions, angling pressure and success.

Wales, J. H. and M. H. Coots
1949. Creel census—May 1, 1949, Klamath River, Siskiyou County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-25, 3 p. (Typewritten)
Catch analysis.

Coots, M. H.
1950. Creel census—April 29, 1950, Klamath River, Siskiyou County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-27, 3 p. (Typewritten)
Opening day catch composition, fishing intensity and success.

Wales, J. H.
1950. Creel census, Shasta River, Siskiyou County, April 29, 1950. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-30, 6 p., 3 tbls. (Typewritten)
Opening day angling intensity and success; catch composition, sporting values.

Coots, M. H.
1951. Creel census—April 28, 1951, Klamath River, Siskiyou County. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-21, 3 p., 2 tbls. (Typewritten)
Opening day statistics; adverse water and weather conditions; catch composition.

Curtis, Brian
1951. Yield of hatchery trout in California lakes. Calif. Fish and Game, vol 37, no. 2, p. 197-215; 3 figs., 10 tbls.
Compilation of material obtained over ten years in nine experimental lakes; yield per lake, stocking intensity, fishing pressure.

Shapovalov, Leo
1951. A remarkable sea journey by a rainbow trout (*Salmo gairdnerii*) of "interior stock." Calif. Fish and Game, vol. 37, no. 4, p. 489-490.
Notes Mendocino County recovery of specimen tagged on North Umpqua River in Oregon; 296-day trip of 100 miles of river and 300 miles of ocean, averaging minimum of 1⅓ miles per day; concludes no complete answer to question of difference between rainbow and steelhead, but notes that small rainbow of purest supposedly non-migratory stock capable of and may make prolonged sea journeys, but probably lack homing instinct.

Bailey, E. D.
1952. The 1951 creel census report on the riffle fishery of the lower Klamath River, Del Norte County. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-22, 18 p., 1 fig., 6 tbls. (Typewritten)
Description of area and fishery; fishing accessibility, intensity, quality, methods, success.

Coots, M. H.
1952. Creel census—May 3, 1952, Klamath River, Siskiyou County. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-9, 4 p., 2 tbls. (Typewritten)
Water conditions, angling success.

Wales, J. H.
1952. Creel census—May 3, 1952, Shasta River, Siskiyou County. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-8, 5 p., 2 tbls. (Typewritten)
Opening day count; estimate of angling success and intensity.

Bailey, E. D. and J. B. Kimsey
1953. Opening day creel census of north coastal lagoons. Calif. Dept. Fish and and Game, Inland Fish. Br., Adm. Rept. 53-3, 15 p., 3 tbls. (Typewritten)
Description, stocking records, accessibility, angling intensity and success of individual waters.

Coots, M. H.
1953a. Creel census—May 2, 1953, Klamath River, Siskiyou County. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 53-8, 3 p., 3 tbls. (Typewritten)
Angling intensity, success, quality; catch composition.

Coots, M. H.
1953b. Creel census—May 2, 1953, Shasta River, Siskiyou County. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 53-13, 10 p., 2 figs., 3 tbls. (Typewritten)
Angling intensity, success, quality, accessibility; catch composition.

Kimsey, J. B.
1953. Experimental hatching of steelhead in the presence of oligochaete worms with a suggested program of further investigation. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-7, 5 p., 1 fig., 3 tbls. (Processed)
Methods and materials; introduction of eggs, live and dead fry, control methods.

Bailey, E. D.
1954. Ocean recoveries of Sacramento river tagged steelhead. Calif. Fish and Game, vol. 40, no. 4, p. 436.
Notes first but not unexpected recoveries outside Golden Gate of specimens tagged during upstream spawning migration.

Coots, M. H.
1954a. Creel census—May 1, 1954, Klamath River, Siskiyou County. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 54-14, 4 p., 2 tbls. (Typewritten)
Opening day count; angling intensity and success, catch composition.

Coots, M. H.
1954b. Creel census—May 1, 1954, Shasta River, Siskiyou County. Calif. Dept. Fish and Game, Inland Fish. Br,, Adm. Rept. 53-10, 10 p., 2 figs., 3 (Typewritten)
Seventh annual opening day count; angling intensity and success, catch composition.

DeWitt, J. W., Jr.
1954. A survey of the coast cutthroat trout, *Salmo clarki clarki* Richardson, in California. Calif. Fish and Game, vol. 40, no. 3, p. 329-335, 2 figs., 2 tbls.
Results of 1951 study to determine general distribution and status of declining population restricted to area bounded by Eel River, Oregon boundary, Pacific Ocean and Coast Range summit; miportance of Smith River system; distinctive features separating from rainbow series, presence of hyoid teeth; sea runs, spawning, numbers above barriers constituting resident, breeding populations.

Wales, J. H.
1954. A comparison of the migratory tenedencies of brown and rainbow trout. *Salmon and Trout Magazine*, no. 142, p. 491-499.
Steelhead-rainbow problems, relative migratory tendencies and experiments in California; size, coloration, extent of genetic purity, barriers; 1940 Mt. Shasta hatchery experiment, 1944 British Columbia experiment, Upper Sardine Lake, Sierra County experiment; differences in morphology, diet, habits of lake forms; concludes that migratory steelhead properly *Salmo gairdneri gairdneri* and resident rainbow *Salmo gairdneri irideus*.

Pintler, H. E.
1956. A report on the proposed Uvas Creek Reservoir, Santa Clara County, California, and its relation to fisheries management plans. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-15, 16 p., 2 figs., 1 tbl. (Typewritten)
Survey to determine effects of proposed dam construction on stream producing excellent steelhead; description of drainage, fish population, water development project, fish rescue plans; management recommendations; concludes that dam with no fishway would remove forty miles of good spawning gravel; reservoir use would result in highly fluctuating water level having adverse affect on fish forage production.

Pintler, H. E. and W. O. Johnson
1956. Chemical control of rough fish in the Russian River drainage, California. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-13, 48 p., 5 figs., 8 tbls. (Processed)

Project designed to improve river and tributaries as game fish habitat; description of drainage system, species present; methods and materials of control program, application and regulation; population samplings; control versus elimination, sources of reinfestation.

Fisher, C. K.

1957a. The 1953-54 and 1954-55 winter steelhead fisheries of the San Lorenzo River, Santa Cruz County. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-13, 16 p., 3 figs., 7 tbls. (Processed)

Description of study area to determine value of stocking yearling steelhead; spawning runs; catch records, effort, success, quality.

Fisher, C. K.

1957b. The 1954-55 steelhead fishery on the Gualala River, Mendocino-Sonoma Counties. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-15, 13 p., 1 fig., 5 tbls. (Processed)

Second report in series; description of river and drainage, effect of improper logging practices, old log dams, debris, siltation; census methods and materials; catch records, effort, success, quality; weather and water conditions; concludes that fishery not over-exploited.

See Kimsey (1953) for first population sampling.

Hallock, Richard

1957. Steelhead draw anglers to upper Sacramento. *Outdoor California*, vol 17, no. 4, p. 10-11, 2 figs.

Increase in fishery because of Shasta Dam's stabilizing and cooling effect on downstream waters; operation of rearing, marking, releasing program at Coleman Hatchery; downstream trapping, creel checks, spawning runs.

Johnson, W. C.

1957. A progress report on the Russian River fish population study; 1954-1956. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-16, 14 p., 1 fig., 1 tbl., Appendix I-II. (Processed)

Evaluation of habitat improvement program; status of lower river population before and after chemical treatment; methods and materials; number and species collected; concludes that treatment program affected population dynamics of entire river; game fish improved.

Wales, J. H.

1957. Trout of California. Calif. Dept. Fish and Game, informational booklet. 30 figs. and pls.

Recognized, invalid and extinct species; species distinguishing characteristics, distribution in California, interesting life history facts.

SALMON AND STEELHEAD

Stone, Livingston
1886. Report of operations at the U. S. salmon and trout stations on the M'Cloud River, California, for the years, 1885-'87. U. S. Comm. Fish and Fisheries, Report for 1886, Part XIV, p. 737-745.
Notes no active operations, no new developments; diseases of trout, beginning of spawning seasons, numbers of eggs, temperature of air and water.

Jordan, D. S.
1894. Salmon and trout of the Pacific coast. *In* Calif. Bd. Fish. Comm., 13th Biennial Rept., p. 125-141, 10 pls.
Speciation, derivation of names, distribution, distinguishing characteristics, weight, length, habits, fishing areas and effort.

Snyder, J. O.
1907. The fishes of the coastal streams of Oregon and northern California. U. S. Bur. Fish., Bull., vol. 27, doc. 638, p. 183.
Survey of all streams reaching ocean between Columpia and Sacramento Rivers except Klamath; species present, description, condition, habitat.

Scofield, N. B.
1913. The towing of salmon and steelhead fry from Sacramento to the sea in a "live car." *In* Calif. Fish and Game Comm., Fish Bull. 1, p. 16-17.
Report of experiment to determine if water conditions at or below Sacramento prevent planting and to determine effect of salinity; construction of car, number and length of fry; brackish water, temperature, salinity, loss, food.

California State Chamber of Commerce. Research Department
1929. Preliminary report to the Klamath River study committee. 17 p. (Processed)
Area land classification, agriculture, irrigation; commercial catch of salmon by district 1923-1927, disposition of catch, egg collection records 1916-1928, hatchery distribution by counties 1923-1927.

Shapovalov, Leo
1932. Report on a survey of the streams in the vicinity of Cloverdale, California. Calif. Div. Fish and Game, Inland Fish. Br., Adm. Rept. 32-1, 9 p.
Results of survey to determine any deleterious effect on trout of hardhead populations and measures for elimination if necessary; day-by-day observations and collections; stomach analyses, predation by garter snake and red-tail hawk, effect of dams; notes popular belief regarding positive deleterious effect, but no fish remains in any stomach of collected specimens; recommends vertical three-foot dams and subsequent seining and dynamiting if removal of hardheads desirable.

Needham, P. R.
1934. Quantitative studies of stream bottom foods. Amer. Fish. Soc., Trans., vol. 64, p. 238-247, 4 tbls.
Report of one aspect of California Trout Investigations field work; methods, distribution of foods in relation to stream width, types of bottom in relation to food amounts, seasonal distribution, wet weight per square foot in streams of varying widths; description, sampling, presence of foods in Waddell Creek; notes that Klamath system richest drainage basin in production of aquatic foods; notes that winter conditions in California streams in no way comparable to northeastern states; concludes that at least as much if not more food present in winter than in summer in California inland and coastal streams.

Taft, A. C., and Leo Shapovalov
1935. A biological survey of streams and lakes in the Klamath and Shasta National Forests of California. U. S. Bur. Fisheries. 71 p., 10 tbls. (Processed)
Part of 1934 nationwide work to gather useful descriptions of drainage basin fishing waters; location, general character and description of streams and lakes; temperature, chemical condition, food supply, fishes present, fishing intensity and accessibility; angler catch analysis, length,

weight; loss in unscreened mining and irrigation ditches, barriers; recommendations for planting, stream and lake improvement, water flow regulation by construction of equalizing dam below Copco works.

Bartholomew, P. S.

1936. Report on a survey of diversions from streams in the Klamath River watershed. 76 p., 1 fig., 7 tbls. (Typewritten) (Available at Calif. Dept. Fish and Game Library, Sacramento, Calif.)

Report of U. S. Bureau of Fisheries and U. S. Forest Service stream improvement program; area surveyed, characteristics of streams, importance to fish resources, migratory habits with reference to diversion loss; obstructions, barriers, diversions, screens, ladders; destructiveness of irrigation ditches and unscreened diversions; problems of screening, possible rearing pond sites; law infringements.

Needham, P. R., and others

1936. Report of the Klamath-Trinity River fact finding committee. Calif. State Chamber of Commerce, Conservation Dept., 26 p., 9 tbls., especially p. 9-16 and p. 23-25. (Processed)

Presentation of facts without recommendations; recreational considerations, mining data, rainfall and river flow data, fish runs, turbidity of water and affect on fish and food; early historical depletion of spring runs; current scattered numbers of king salmon in July and peak in middle August with rapid September decline; steelhead migratory peak to uppermost tributaries September through November; notes lack of factual proof of adverse affect on fish of mining silt, but notes adverse affect on stream bottom organisms; green colored turbidity advantageous.

Taft, A. C.

1936. The Waddell Creek experimental station for trout and salmon studies. Calif. Fish and Game, vol. 22, no. 2, p. 99-104, 3 figs.

Devoted to construction and operation of dams and traps.

Elliger, C. O.

1937. Report on possible regulation of fluctuating water flow of Klamath River caused by operations of California Oregon Power Company. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 37-10, 10 p., 16 pls. (Typewritten)

Operation, flow, discharge; effect of proposed dam construction, Fall Creek hatchery operation.

Elliger, C. O., and Leo Shapovalov

1937. Report on effects of proposed debris dams on the Yuba and American Rivers, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 37-6, 5 p. (Typewritten)

Notes plans to restore hydraulic mining in watersheds; runs of fish supported by rivers, spawning areas, obstructions, ladder operation, effect of silting.

Shapovalov, Leo

1937. Report on an investigation of debris and pollution in the streams in and about Little Lake Valley, near Willits, Mendocino County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 37-8, 14 p. (Typewritten)

Description of area, potential spawning grounds, species present, effect of debris and obstruction, deforestation, pollution; suggestions for improvements.

Taft, A. C., and Leo Shapovalov

1938. Homing instinct and straying among steelhead trout (*Salmo gairdneri*) and silver salmon (*Oncorhynchus kisutch*). Calif. Fish and Game, vol. 24, no. 2, p. 118-125, 2 figs., 3 tbls.

Report of experiment in Scott and Waddell Creeks and Klamath River; markings, liberations; depletion factors; concludes that homing operates within river system and that continued fresh water influence not necessary; notes that experiment results contradict theory advanced by Huntsman (1937a).

Note: also appears in *Calif. Conservationist*, vol. 3, no. 5, p. 1-2, 22.

Shapovalov, Leo
1939a. Fish culture in the Eel River basin. *Calif. Conservationist*, vol. 4, no. 2, p. 3-5, 18-20, 4 figs.
Report of survey to secure accurate description of river waters and tributaries and to design and recommend sound management program; description and economy of basin; fishes present, clarification of misconceptions; spawning and migratory habits; fishing intensity and accessibility, ill effect of low water, pollution, fish cultural operations, depletion; concludes that if artificial propagation ceased, spawning runs would be at least 90% of 1939 volume; fish rescue successful; pollution damaging in some areas.

Shapovalov, Leo
1939b. Recommendations for management of the fisheries of the Eel River drainage, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 39-2, 43 p. (Typewritten)
Methods and materials; description of area surveyed, species present, fishing intensity and accessibility, dams and diversions, barriers, effect of low water, pollution, fish cultural operations; concludes that stocking alone cannot maintain fishing level in coastal streams; high natural propagation; recommends fish rescue; stream improvement; pollution control; regulations.

Shapovalov, Leo
1940a. Preliminary report on the effect of the use of water at Lake Pillsbury and at Van Arsdale Reservoir on the salmon and trout of the Eel River system. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-1, 1 tbl. (Typewritten)
Description of waters, characteristics and area of drainage basin.

Shapovalov, Leo
1940b. Report on possibilities of establishment and maintenance of salmon and steelhead runs in Cache and Putah Creeks. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-16, 47 p., 14 figs. (Typewritten)
General description of watershed, topography, water flow and temperature, flood control and water use, dams and barriers, changes in creek character; species present including black bass, carp, striped bass and shad; effects of deforestation, overgrazing, silting, road work, and Central Valley Project construction; concludes no feasible way of bringing creek waters directly into Sacramento River; runs of anadromous species into creeks possible only in years of favorable rainfall and use of Yolo By-Pass; trout in headwater tributaries form largely independent, self-sustaining populations; recommends management of Putah Creek as smallmouth black bass stream.

Sumner, F. H. and O. R. Smith
1940. Hydraulic mining and debris dams in relation to fish life in the American and Yuba Rivers of California. Calif. Fish and Game, vol. 26, no. 1, p. 2-22, 10 figs.
Summary of 1938 biological survey report submitted to Corps of Engineers; physical features of rivers, history of mining and dams, distribution and records of fish, effect of debris dams and mining debris on fish and fish foods, natural erosion; concludes that future spawning runs of salmon and steelhead will be blocked by dams, young trout lost in diversion ditches unless screened, muddy water discourages salmon spawning, renewed hydraulic mining only slightly detrimental to sport fishing; recommends fish screen and by-pass at Folsom Dam power diversion, fish ladders at Daguerre Point Dam, South Fork American salmon falls, screening of all diversions, correction of cyanide pollution and heavy silting.

Shapovalov, Leo
1941a. Preliminary notes for a fish management program for the Mendocino County coast area. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 41-14, 7 p., 1 fig. (Typewritten)
Investigation to determine program to maintain or increase level of runs; possible hatchery sites, stocking, fish rescue, stream improvement.

Shapovalov, Leo
1941b. Prospectus for an Eel River fishery management area. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 41-15, 61 p., 12 figs. (Typewritten)
Proposals for set up on experimental basis; description of area; fish rescue, physical and biological improvement, census, planting and marking, pollution, natural and artificial barriers.

Shapovalov, Leo
1944. Preliminary report on the fisheries of the Russian River system, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-13, 8 p. (Typewritten)
Description of area, climate, streams, flow, diversions and dams, spawning areas, fishing intensity and success, stocking, fish rescue; notes species as steelhead, silver salmon, black bass, striped bass.

Wales, J. H.
1944. The Klamath River at different stages of flow. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-25, 13 p. (Typewritten)
Observations on Fall Creek to Shasta River study section to determine basis for minimum flow recommendations; tributary flow, depth, width; notes that amount of spawning area key factor and that reduction below 1,000 c. f. s. would reduce areas and lead to diminished fishery.

Shapovalov, Leo
1945(?). Probable effects of the three proposed dams on the fisheries of the San Lorenzo River, Santa Cruz County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-31 (?), 10 p. (Typewritten)
Proposed construction for purpose of domestic water supply, irrigation and flood control; physiography of river system; fishery resources, spawning areas, fishing intensity and success; fish ladders, diversions, temperature requirements.

Hubbs, C. L.
1946. Wandering of pink salmon and other salmonid fishes in Southern California. Calif. Fish and Game, vol. 32, no. 2, p. 81-86.
Notes historical occurrence of specimens south to Baja California; concludes that king salmon range to San Diego County, silver salmon to Los Coronadoes Islands, steelhead in San Diego and Tijuana Rivers; no valid reason for *Salmo nelsoni* specific and subspecific separation.

Shapovalov, Leo
1946. Recommendations for the management of Arroyo Corte Madera del Presidio and Old Mill Creek, Marin County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-5, 7 p. (Typewritten)
Description of streams; spawning areas, temperature, flow, barriers, stocking recommendations.

Shaw, P. A.
1946. Oxygen consumption of trout and salmon. Calif. Fish and Game, vol. 32, no, 1, p. 3-12, 3 figs., 6 tbls.
Details of experimental work undertaken at four hatcheries in 1933 and 1934; methods, minimum water requirements.

Wales, J. H.
1949. Klamath River fluctuations. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-19, 17 p., 1 fig., 2 tbls. (Typewritten)
Effects of flow on fish and foods, irrigation diversion, spawning, stranding, predators; recommends minimum discharge of 500 c.f.s.
See Wales and Coots (1950).

Coots, Millard
1950. Klamath River fluctuations in relation to salmonids. 7 p., 1 fig., 2 tbls. (Typewritten) (Available at Calif. Dept. Fish and Game Library, Sacramento, Calif.)
Regulation in flow by dams and powerhouses of California Oregon Power Company; power demands, stranding of fish by discharge reduction; 1945-1948 studies to determine numbers stranded, methods, station locations; notes 167:15 hours search over 471,665 square feet of exposed

river bottom, 282 specimens found; location of most rapid fluctuations; predators; assumes that daily fluctuations not as harmful to eggs as claimed.

Wales, J. H.

1950. Recommendations for management of the Trinity River, Trinity County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-47, 12 p., 1 fig., 3 tbls. (Typewritten)

Effect of proposed Bureau of Reclamation dams, compensating management work; river flow, spawning grounds improvements, distribution of specimens, control of mining silt, artificial propagation, stocking.

See Wales (1951).

Wales, J. H. and M. H. Coots

1950. Second report on the effect of the Klamath River water fluctuations upon the salmonid fishes. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-45, 6 p., 2 tbls. (Typewritten)

Extent of search for stranded specimens, measurement of exposed river bed, number of water fluctuations per year.

See Wales (1949).

Murphy, G. I. and J. W. deWitt, Jr.

1951. Notes on the fishes and fishery of the lower Eel River, Humboldt County, California. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-9, 30 p., 1 fig., 13 tbls. (Processed)

Description of study area, water temperature, specific gravity, runoff; fishery, seasons, methods and areas of fishing, catch records; spawning run, downstream migration; avian predation; list of freshwater, anadromous and marine species.

Murphy, G. I. and Leo Shapovalov

1951. A preliminary analysis of Northern California salmon and steelhead runs. Calif. Fish and Game, vol. 37, no. 4, p. 497-507, 1 fig., 4 tbls.

Measures of abundance from fishway counts and commercial catch; correlation between sets of data, factors of runs; density-dependent mortality factors, fresh-water phase of life cycle factors.

Wales, J. H.

1951a. Recommendations for management of the Trinity River, Trinity County; part two: recommended action. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-4, 8 p., 2 tbls. (Typewritten)

Specific recommendations; release schedule, low level release, location of distributing and counting barrier, storage reservoirs, downstream migration, mining pollution.

See Wales (1950).

Wales, J. H.

1951b. Sacramento River experimental stream; report for 1950. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-25, 24 p., 3 figs., 11 tbls. (Typewritten)

Fourth year of investigations; check of anglers, electrical shocking; catch composition, estimated fish per mile, contribution of hatchery fish.

Bailey, E. D.

1952. A first progress report on the experimental program for the Mad River, Humboldt County, California. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-5, 29 p., 1 fig., 11 tbls. (Typewritten)

Eight year evaluation program of hatchery and natural propagation of anadromous fishes and determination of increasing physical environment; description and history of stream and drainage; trapping of downstream migrants, test seining, species present, planting of marked hatchery specimens, egg and scale taking.

Coots, M. H.

1952. Klamath River creel census, Copco to the Salmon River, Siskiyou County, 1949-1950. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-28, 64 p., 16 figs., 6 tbls., appendix 1-5. (Typewritten)

Description of area, water fluctuations and angler movement; counting methods and materials; species present; sports fishery, tackle analysis, length frequency of catch; weather, runoff, temperature, atmospheric condition, river accessibility, lamprey parasitism.

Briggs, J. C.

1953. The behavior and reproduction of salmonid fishes in a small coastal stream. Calif. Dept. Fish and Game, Fish Bull. 94, 62 p., 5 figs., 8 tbls.

Results of daily stream observations October 1948-June 1949 and October 1950-May 1951 to obtain information on spawning behavior, extent of natural mortality during egg and larval stages and to compare results with observations in other areas; description of study area within watershed of Prairie Creek; range; migration time, stimuli and rate; location, character and classification of redds; breeding activities and ratios, postspawning activities; redd sampling methods, materials, marking; degree of natural fertilization, loss in artificial propagation; concludes that silvers have wide range, prefer smaller coastal streams for reproductive purposes, migration after fall rain effect on runoff; almost all return to California waters in third year, marked sexual dimorphism, secondary sexual characteristics used for threat with definite intrasexual selection value; small excess of males in breeding population; migration to smaller tributaries or mainstream headwaters; female alone responsible for selection, defense and construction of redd area; three-fourths of redds constructed in trial and postspawning categories; concludes that kings enter fresh water in autumn and complete breeding activities before spring; dimorphism not as marked as in silvers; spawn in lower portions of main stream, no noticeable differential distribution between early and later arrivals; redd selection in greater water depth and velocity than silvers, larger gravel size, deeper egg burial; mort highly developed territorial behavior having positive effect on increased reproductive efficiency; three-fourths of redds constructed in trial and postspawning categories; concludes that steelhead range quite restricted, late fall upstream migration with early spring spawning; distinct barrier to gene flow between permanent fresh-water type and anadromous type; majority mature at four years, sexual dimorphism not as noticeable as in salmon; spatial distribution on spawning grounds almost exactly duplicating kings, egg pits circular rather than oblong; no postspawning territorial defense, little postspawning redd construction; concludes that in study area substantially more young introduced as fry via natural propagation than could be supplied through hatchery methods utilizing entire creek run; notes no injury to three species received on journey to spawning grounds, and simultaneous nature of egg laying and fertilization.

Note: silver salmon material, p. 11-23; king salmon, p. 23-30; steelhead, p. 31-38; bibliography, p. 59-62.

Note: concludes that some results of studies accomplished in other areas and countries (cited in text and bibliography) not necessarily applicable to California waters, especially with regard to migratory stimuli, origin and use of secondary sexual characteristics, value of stocking program, population estimates based on observed number of redds.

Note: appears as Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-34 (1949).

Handley, John and Millard Coots

1953. The removal of abandoned dams in the upper Klamath River drainage, California. Calif. Fish and Game, vol. 39, no. 3, p. 365-396, 5 figs.

Reports removal of 24 dams opening up 210 miles of good spawning streams in Siskiyou and Trinity Counties; history of areas, effect of dams on fish; fish ladder legislation, legal difficulties of dam removal.

Kimsey, J. B.

1953. Population sampling on three north coastal streams closed to summer trout fishing—1952 season; first progress report. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 53-17, 27 p., 15 figs., 6 tbls. (Typewritten)

Electric shocking survey to determine population composition; methods and materials; description of individual waters.

See Fisher (1957) for Gualala River material.

Shapovalov, Leo
1953. An evaluation of steelhead and salmon management in California. Calif. Dept. Fish and Game. 54 p., 3 tbls., App. xviv. (Processed)

Review and analysis of past, present and proposed management practices with immediate purpose of reaching decision with respect to establishing management facilities at Cedar Creek, Mendocino County; history policies; crux of problem as justification of monetary expenditures to operate salmon and steelhead hatcheries; brief description of management practices in Alaska, British Columbia, Washington, Oregon, Japan, New Zealand; trend of California angling 1936-1951, artificial propagation operational costs, regulations, physical and biological habitat improvements; concludes that no direct evidence of artificial propagation primarily responsible for fishery run maintenance; high efficiency of natural spawning; greatest mortality following emergence from gravel; recommendations for improved program.

United States Fish and Wildlife Service and California Department of Fish and Game
1953. A plan for the protection and maintenance of salmon and steelhead in the American River, California, together with recommendations for action. 47 p., 4 figs., 8 tbls., 5 pls. (Processed)

Report concerned with effects on anadromous fishery resources of Nimbus Dam; time and size of adult salmon runs, sex ratio, fecundity, habits of young, distribution of adults; time and size of adult steelhead runs, habits of young; possibility of loss at Nimbus powerhouse, ability of adults to enter turbines; stream improvement, natural and artificial spawning areas, fish weirs, fishways, holding ponds, hatchery requirements and operation; concludes that kings enter American River in well-defined spring and fall runs; estimated 26,000 annual runs; 72.5% average of annual runs spawn above dam site; average egg yield estimated at 6,500; average annual number deposited above site calculated at 47.5 million; migration begins February 1, peak between April 1-May 15 and lasting into June; little knowledge of river steelhead natural history; proposed fish rack downstream preventative of fish approaching powerhouse; little possibility of harmful effects of turbines; recommends full utilization of spawning area below dam, redistribution of gravels prior to September 15, 1954; establishment of hatchery; testing of artificial spawning channel.

Bailey, E. D.
1954. Time pattern of 1953-54 migration of salmon and steelhead into the upper Sacramento River. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 54-9, 3 p., 2 figs., 1 tbl. (Typewritten)

Brief report on fyke net operation at Fremont Weir; number of trapped specimens, catch per trap hour.

See VanWoert (1955, 1956, 1957) for supplementary studies.

California. Water Resources Board
1954. Interim report on the Klamath River basin investigation; water utilization and requirements. 117 p., 34 tbls., 18 pls.; especially p. 85-89.

Importance of system as prime source of kings and steelhead rainbows; prevalence of resident species; spawning grounds; estimated 1952 retail and recreational value; spawning runs, peaks, extent; notes that habitat improvement would need to include better spawning areas, reduction in rapid water level fluctuations and increased stream flows and cooler water temperatures during late summer and early fall months.

Shapovalov, Leo and A. C. Taft
1954. The life histories of the steelhead rainbow trout (*Salmo gairdneri gairdneri*) and silver salmon (*Oncorhynchus kisutch*): *with* special reference to Waddell Creek, California, and recommendations regarding their management. Calif. Dept. Fish and Game, Fish Bull. 98, 375 p., 32 figs., 44 tbls., 90 tbls. in Appendix.

Report prepared in response to requests from administrators, legislators, biologists and sportsmen for basic, quantitative information on species; description and reasons for selection of study area in Santa Cruz County; methods, materials, terminiology; fish and other vertebrate fauna of creek; closure of stream mouth by sand bars during

portion of annual dry season; life histories under following categories: time and size of spawning migration, age and size of fish, sex ratio, changes in sex-age composition during run, factors influencing upstream migration time, maturation body form and coloration changes, spawning beds, spawning; egg production, embryology and hatching; emergence from gravel, pre-seaward migration life, factors influencing time of migration and size at migration, migration characteristics; sea life, homing and straying, survival, diseases, teratology, food habits; predators in fresh and sea water; recommendations for management; concludes that silver salmon spawn November-January, do not ascend in large numbers more than 150 miles, no large over-all percentage of loss of eggs; all die after first spawning as result of physiological changes independent of spawning rigors; indications of high and constant fertilization percentage; percentage of hatch probably principally dependent upon amount and character of silting; following emergence peak marked decline in numbers caused by mortality; seaward migration begins approximately one year following emergence; schooling night or twilight character of migration and 1:1 sex ratio; established fact of "homing"; concludes that steelhead spawning over long period with peaks occurring during week of January 6th and March 17; migration to sea at various ages and over long period, spawn more than once, sometimes spawn before first seaward journey, spending all lives in fresh water; fertilization percentage high; silting occurring between fertilization and hatching probably principal cause of pre-hatching losses; marked decline following emergence, caused by mortality; main predation on juvenile salmon and steelhead caused by steelhead and fresh-water sculpins; adult specimens subject to very little predation in fresh water; recommends summer season if permitted open not earlier than end of May; closure of lagoons and tidal waters of all coastal streams except during winter angling season; desirable physical habitat improvements; artificial propagation of aged fish as aid to natural propagation, not replacement.

Note: life history of silver salmon, p. 33-108; of steelhead, p. 108-251; bibliography, p. 299-303.

Gibbs, E. D. and J. B. Kimsey

1955. The 1951 creel census of the boat fishery of the Klamath River estuary, Del Norte County. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-16, 18 p., 4 figs., 9 tbls. (Processed)

Description of fishery, methods of census; fishing intenstiy, success, quality; length, weight, age.

VanWoert, William

1955. Time pattern of migration of salmon and steelhead into the upper Sacramento River during the 1954-55 season. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-17, 3 p., 2 figs., 1 tbl. (Processed)

Daily trapping records.

Note: supplements Bailey (1954)

Cordone, A. J.

1956. Effects of logging on fish production. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-7, 98 p. (Processed)

Three part survey of existing knowledge; annotated bibliography of literature, regulations and policies.

California. Department of Fish and Game.

1956a. Fish news for timber operators and fishermen. Bull. no. 1, 4 p., 3 figs. (Processed)

Popular presentation of steelhead and salmon problems; reproduction, spawning area requirements, life history notes; effects of siltation, barriers, erosion, higher water temperature; fish loss; legislation.

California. Department of Fish and Game.

1956b. Fish news for timber operators and fishermen. Bull. no 2, 3 p., 4 figs. (Processed)

Second in series of popular presentation of problems; importance of small, narrow, upper reaches of streams; effect of erosion; suggestions for improvement.

California. Department of Fish and Game
1956c. Fish news for timber operators and fishermen. Bull. no. 3, 3 p., 2 figs. (Processed)
Third in series; emphasizes need for cooperation in conservation practices.

California. Department of Fish and Game
1956d. Fish news for timber operators and fishermen. Bull. no. 4, 2 p., 2 figs., 31 pls. in appendix. (Processed)
Fourth in series; devoted to illustrations showing logging operations damaging and not damaging streams.

Hinze, J. A., A. N. Culver and G. V. Rice
1956. Annual report, Nimbus salmon and steelhead hatchery, fiscal year of 1955-56. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-25, 50 p., 11 figs., 13 tbls. (Processed)
First in series reporting operation of unit designed to maintain anadromous populations formerly spawning in American River above Nimbus and Folsom Dams; history and operation of installation, water conditions affecting operations; number and composition of 1955 runs; production of egg, alevin and fingerlings; planting, carcass processing, experimental work, disease history, fertility checks, holding and rearing ponds, mortality; notes that 7439 salmon entered ponds, 3012 females having average of 5343 eggs each; possible relationship between occurrence of gas embolism affecting alevin and turbidity of storm water.

VanWoert, William
1956. Time pattern of migration of adult salmon and steelhead into the upper Sacramento River during the 1955-56 season. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-20, 3 p., 2 figs., 1 tbl. (Processed)
Summary of daily trapping records; third in series.

Warner, G. H.
1956. Report on Clear Creek, Shasta County, with reference to fishway project on McCormick-Saeltzer Dam. Calif. Dept. Fish and Game, Bur. Mar. Fish., booklet, 6 p. (Processed)
Protection of ten miles of potential spawning area; dam construction plans, fishway cost estimates, description of stream section review of previous studies; concludes that spawning area between McCormick-Saeltzer Dam and Whiskeytown Dam site capable of supporting run of 6000 salmon valued at $105,000 annually.

VanWoert, William
1957. Time pattern of migration of adult salmon and steelhead into the upper Sacramento River during the 1956-57 season, and length-weight relationship of Sacramento River steelhead. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-19, 5 p., 2 figs., 1 tbl. (Processed)
Fourth in series reporting movements past Fremont Weir; graphs of time patterns.

Wales, J. H.
1957. Trout of California. Calif. Dept. Fish and Game, informational booklet, 56 p., 30 figs. and pls.
Recognized, invalid and extinct species; distinguishing characteristics, distribution, interesting life history facts.

Pintler, H. E. and W. C. Johnson
1958. Chemical treatment of rough fish in the Russian River drainage, California. Calif. Fish and Game, vol. 44, no. 2, p. 91-124, 11 figs., 10 tbls.
Report of experimental project on nearly half of drainage system in Mendocino and Sonoma Counties to check adverse effect of rough fish on steelhead fishery; description of drainage, species and fishery, operational phases, cost; incidental notes on salmonid scarcity and during treatment.

Tharratt, R. C.
1958. Summary of salmon and steelhead marking experiments in California, 1949-1958. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 58-8, 11 p. (Processed)

Listing of activities by various organizations, deviations from previously published figures due to errors in failure to subtract marking and planting mortalities, adjustment of records to conform with "brood year" definitions; species and mark, brood year, area of experiment, source of eggs, dates and number planted, average length or number per pound, purpose of marking.

VanWoert, William

1958. Time pattern of migration of salmon and steelhead into the Upper Sacramento River during the 1957-58 season. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 58-7, 4 p., 1 fig., 1 tbl. (Processed)

Fifth in Fremont Weir series; results of trapping 1861 kings, 692 silvers and 2187 steelheads; results of initial March 1956 introduction of silvers; age group separation.

SHAD

Alosa sapidissima

Nidever, H. B.
1916. Shad in California. Calif. Fish and Game, vol. 2, no. 2, p. 59-64, 5 figs.
Historical presentation of successful June 1871 introduction and subsequent planting, fishery, market value, regional landings, methods of fishing, untapped status of population.

Starks, E. C.
1918. The herrings and herring-like fishes of California. Calif. Fish and Game, vol. 4, no. 2, p. 63, 1 fig.
Description, distribution, habitat.

Clark, G. H.
1930. Shad. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 36-39, 3 figs.
Planting history, roe and buck composition of total catch, fishing methods and areas, restrictions, factors influencing catch.

Neale, George
1931. Shad. *In* The spiny-rayed game fishes of the California inland waters. Calif. Fish and Game, vol. 17, no. 1, p. 13, Plate 11.
Notes introduction and successful adaptation.

Nidever, H. B.
1937. Shad. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 54-56, 2 figs.
Introduction and success, feeding conditions, spawning areas, fishing methods, regulations.

California Conservationist
1940. Take shad off Ft. Bragg. Vol. 5, no. 5, p. 21.
Notes unusual catch by drag boat operators of 1,000 pounds of twelve to fifteen inch specimens in 92 fathoms.

Hatton, S. R.
1940. Progress report on Central Valley fisheries investigation, 1939. Calif. Fish and Game, vol. 26, no. 4, p. 335-373, 6 figs., 14 tbls., Appendix A-C.
Partial results of biological survey to determine effect of Central Valley Project on fish population; scope of investigation; spawning areas, seaward migration, food preferences, size; notes insufficient water for normal migration; unscreened diversions, pumps and flood gates; pollution.

Note: augmented adaptation appears in *California Conservationist*, vol. 6, no. 5 (1941), p. 11, 22; as "Feeding habits of the striped bass and shad."

Sumner, F. H. and O. R. Smith
1940. Hydraulic mining and debris dams in relation to fish life in the American and Yuba rivers of California. Calif. Fish and Game, vol. 26, no. 1, p. 2-22, 10 figs.
Summary of 1938 biological survey report submitted to Corps of Engineers; physical features of rivers, history of mining and dams, distribution and records of fish, effect of debris dams and mining debris on fish and fish foods, natural erosion; concludes that renewed hydraulic mining only slightly detrimental to sport fishing.

McCully, Howard
1949. Shad. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 49-51, 1 fig.
Introduction and success; history, methods and value of fishery; regulations.

Skinner, J. E.
1953. Observations on the shad gill net fishery in 1954, with reference to its effect on striped bass. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-3, 12 p., 3 figs., 10 tbls. (Processed)
Results of survey to obtain measure of relationship between striped bass sport fishery and shad commercial fishery; history of shad fishery,

introduction, catch records 1916-1954, areas, seasons and value; history of striped bass fishery, introduction, catch, regulations; ratio of bass to shad in nets, bass mortality; concludes that opening of shad season preceded principal run by full month; striped bass outnumbered shad in nets during earlier part of season; at height of shad run, striped bass comprised 12% of catch; estimated 90% bass net mortality in flats, 15% in channel; recommends April 10 beginning of shad season; complete closure of Honker and Grizzly Bays to all gill netting.

Note: see Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-2, Part VII for summarization of field observations.

Warner, George

1956. The shad is a real fighter. *Outdoor California*, vol. 17, no. 6, p. 4, 11, 5 figs.

Report on fishery possibilities of underrated and underharvested sport species; description, habits, initial introduction and success, spawning migration, lack of angling restrictions; best fishing areas, gear and methods.

Chadwick, H. K.

1958. A study of the planktonic fish eggs and larve of the Sacramento-San Joaquin Delta with special reference to the striped bass (*Roccus saxatilis*). Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 58-5, 24 p., 2 figs., 9 tbls. (Typewritten)

Study to determine cause of discrepancy between growth rates reported by eastern and western biologists; methods and materials of surface plankton net operations, areas of collection; condition of eggs and larve, possible spawning dates; temperature and salinity; concludes peak of shad spawning late May and early June in Feather and Sacramento Rivers above Sacramento.

STRIPED BASS

Roccus saxatilis

Woodbury, J. C.
1890. Striped bass. *In* Calif. State Bd. Fish Comm. 11th Biennial Rept., p. 36-37.
Notes success of 1874 and 1882 introduction of 435 fish; need for protective measures and San Francisco Board of Supervisors' 1890 ordinance for eight-pound minimum weight limit.

Smith, H. M.
1896. A review of the history and results of attempts to acclimatize fish and other water animals in the Pacific states. U. S. Fish Comm. Bull., vol. 15, p. 449-458, 3 tbls, 1 pl.
History of two plants, distribution, migration, movements, schooling, abundance; spawning season and grounds, recommendations for protection; food, method of catch, market condition, fishery statistics.

Scofield, N. B.
1910. Notes on the striped bass in California. Calif. Fish and Game Comm., Biennial Rept., p. 104-109, 1 pl.
Mainly devoted to artificial hatching at Bouldin Island but includes average weight, spring and fall run, schooling, feeding, behavior in sloughs, spawn, abundance, productive areas.

Scofield, N. B. and G. A. Coleman
1910. Notes on spawning and hatching of striped bass eggs at Bouldin Island Hatchery. Calif. Fish and Game Comm., Biennial Rept., p. 109-117, 3 pls.
Description of twelve lots of eggs and milt; general condition, water temperature, food of adult and young, fungus killing experiments.

Starks, E. C.
1919. The basses and bass-like fishes of California, families *Serranidae*, *Haemulidae*, *Kyphosidae*. Calif. Fish and Game, vol. 5, no. 2, p. 59-68, 9 figs.
Descriptive study with incidental mention of range, seasonal abundance, fishery.

Scofield, N. B. and H. C. Bryant
1926. The striped bass in California. Calif. Fish and Game, vol. 12, no. 2, p. 55-74, 4 figs.
History of 1879 introduction and planting; spawning migrations, fecundity, rate of growth, size; feeding habits; commercial value, legislative protection, decrease in catch.

Craig, J. A.
1927. A preliminary report on abundance of striped bass in San Francisco Bay and its tributaries. Calif. Div. Fish and Game, 13 p., 6 figs. (Processed) (Available at Calif. Dept. Fish and Game Libraries, Terminal Island and Sacramento.)
Discusses problem and methods of determining depletion and/or gain in abundance; determination of increase or decrease in availability and number 1920-1925; boat catch analysis from fish buyer tickets and constant unit of gear, boats and personnel records; average boat catch trends; notes correlation between low average boat catch and dry years of little snow; amount of fresh muddy water effect on salinity and cleanness of usual habitat; concludes that healthy condition of fishery aided by adequate protective measures.

Craig, J. A.
1928. The striped bass supply in California. Calif. Fish and Game, vol. 14, no. 4, p. 265-272, 3 figs.
Adaptation after introduction, yearly catch fluctuations; fishing effort, economic conditions, weather conditions, restrictive legislation; notes no reason to fear depletion.

Scofield, E. C.
1928a. Preliminary studies on the California striped bass. Amer. Fish. Soc., Trans., p. 139-145.
Discussion of systematic scientific study undertaken in 1925 by California Division of Fish and Game in an effort to detect depletion and to avert it; age, rate of growth, age of maturity, migrations, food.

Scofield, E. C.
1928b. Striped bass studies. Calif. Fish and Game, vol. 14, no. 1, p. 29-37, 4 figs.
A preliminary report on abundance, age determination, rate of growth, age at maturity, migrations, food, behavior.

Clark, G. H.
1930. Shad, striped bass and salmon. *In* The commercial fish catch of California for the year 1928. Calif. Div. Fish and Game, Fish Bull. 20, p. 39-40, 3 figs.
Notes range from San Diego to Coos Bay; methods of fishing, seasons, effectiveness of restrictive measures, relationship between shad and striped bass fisheries.

Craig, J. A.
1930. An analysis of the catch statistics of the striped bass fishery of California. Calif. Div. Fish and Game, Fish Bull. 24, 41 p., 22 figs., 12 tbls., 1 pl.
Brief history, total catch records, restrictive legislation; daily catch records, average catch in pounds, catch composition, increase in sports fishery, reclamation of overflow delta lands as regards removal of habitat; concludes that to 1927 no evidence of depletion; drop in total catch not indicative of decline in abundance but reflects effect of restrictive legislation and decline in fishing gear and effort.
See Clark (1933 and 1935) for continuation of work.

Neale, George
1931. Striped bass. *In* The spiny-rayed game fishes of the California inland waters. Calif. Fish and Game, vol. 17, no. 1, p. 8-9, Plate 1.
Specific characteristics, nativity and distribution, fishing season and methods.

Scofield, E. C.
1931. The striped bass of California. Calif. Div. Fish and Game, Fish Bull. 29, 82 p., 47 figs., 11 tbls.
Comprehensive and detailed investigation of two factors affecting abundance; natural and artificial conditions; fishery, price, methods of capture, gear, handling of catch; age, growth, spawning, migrations, food, sampling methods, season, catch composition; recommendations for sport catch regulations and pollution of bay mud flats; concludes that age determination accurate by scale readings; rapid growth from June to October; dormancy to April; single migratory population along California coast; twenty-inch minimum length, ten-pound maximum size, May 16-July 31 closed season and closed sloughs and islands give adequate protection of supply; page 57: twenty-two summary points on life history; page 77: eleven summary points on commercial catch.

Clark, G. H.
1932. The striped bass supply, past and present. Calif. Fish and Game, vol. 18, no. 4, p. 297-298, 1 fig.
Brief summary of detailed report, on statistical analysis of striped bass catches from 1928 to August 14, 1931, awaiting publication; increased fishing pressure and increased abundance; effect of early protective legislation.

Scofield, E. C.
1932. A simple method of age determination of striped bass. Calif. Fish and Game, vol. 18, no. 2, p. 168-170, 1 fig.
Presents data additional to Fish Bulletin 29 (1931); completion of age-length, and length-weight curves.

Clark, G. H.
1933. Fluctuations in the abundance of striped bass in California. Calif. Div. Fish and Game, Fish Bull. 39, 18 p., 7 figs., 8 tbls.
Boat catch analysis, unit of effort yield, seasonal changes; commercial catch statistics January 1, 1928-August 14, 1931, when legislation adopted ending legal netting operations; factors influencing catch other than abundance; concludes that population could support commercial and sport fishery; recommends continual analysis to detect significant changes in yield.
Note: constitutes continuation of Craig (1930).
See Clark (1935).

Clark, G. H.
1934. Tagging of striped bass. Calif. Fish and Game, vol. 20, no. 1, p. 14-19, 3 tbls.
Progress report on program begun in September, 1932; type of tag used, number of individuals tagged, dates and locations; recovery date, location and size.
See Clark (1936).

Clark, G. H.
1935. Striped bass abundance. Calif. Div. Fish and Game, 4 p., 3 figs. (Processed) (Available at Calif. Dept. Fish and Game Libraries, Terminal Island and Sacramento.)
Continuation of catch analysis including 1934 commercial fishery season; catch per boat per day, availability, decrease in open season, effect of 1931 legislation, catch trends; concludes that tremendous increase in availability 1920-1934; no depletion evidence; population can support sport and commercial fisheries.
See Craig (1930) and Clark (1933).

Clark, G. H.
1936. A second report on striped bass tagging. Calif. Fish and Game, vol. 22, no. 4, p. 272-283, 1 fig., 4 tbls.
Continuation of tagging work; location and number of tag recoveries, size, distance traveled; no definite migration reported.
See Clark (1934).
Also see Calhoun (1952) for clarification of migration pattern; notes that Clark's principal conclusion that no definite migration but diffusion away from tagging locality based on tagging limited almost entirely to small fish.

Shapovalov, Leo
1936. Food of the striped bass. Calif. Fish and Game, vol. 22, no. 4, p. 261-271, 2 figs., 2 tbls.
Stomach content analysis; food in Waddell Creek Lagoon and San Francisco Bay regions, feeding times and seasons; contains annotated list of published accounts of striped bass food on Atlantic and Pacific coasts.

Merriman, Daniel
1937. Notes on the life history of the striped bass. *Copeia*, p. 15-36, 7 figs.
Preliminary results of 1936 investigation by Connecticut State Board of Fish and Game; range and review of literature; notes scant information on species' life history except on Pacific coast.

Nidever, H. D.
1937. Striped bass. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 56-58, 2 figs.
Extension of range, Sacramento and San Joaquin river and delta nursing grounds, development of sport fishery, controversy between sports and commercial intrests over legislation; 1935 prohibition of commercial fishery, yearly catch, price.

Clark, G. H.
1938. Weight and age determination of striped bass. Calif. Fish and Game, vol. 24, no. 2, p. 176-177, 1 fig.
Reconstruction of Scofield (1932) with additional material, curve of relationship.

Pearson, J. C.
1938. The life history of the striped bass, or rockfish, *Roccus saxatilis* (Walbaum). U. S. Bur. Fish., Bull., vol. 48, no. 28, p. 825-851. (Misnumbered in printing as vol. 49.)
Review of scattered information on life history and presentation of data collected in 1930-1931; references cited from 1637 to 1937; distribution, abundance, spawning grounds and seasons, maturity, eggs and young, growth, food habits, movements, fishery; summary of conclusions, p. 848; notes Chesapeake Bay population wintering in deeper channels of bay and mouths of tributaries, while in southern Atlantic waters remain continually in fresh or brackish water.

Note: included for comparison with California migrations; see Calhoun (1952) for clarification of California pattern; also notes marked and understandable difference in view of many basic dissimilarities between coast lines.

United States. Department of Commerce. Bureau of Fisheries.
1938. Returns show speed of striped bass migration. Fish. Serv., Bull. 272, p. 2.
Report of three returns from middle Atlantic tagging program; average speed of twelve miles per day, and possible relation to drop in water temperature resulting from cold snaps; notes striking southern migration November to December on eastern coast.

Vladykov, V. D. and D. H. Wallace
1938. Is the striped bass (*Roccus lineatus*) of Chesapeake Bay a migratory fish? Amer. Fish. Soc., Trans., vol. 67, p. 67-86.
Indicates fall movement from upper to lower bay and back in spring, apparently reverse of California cycle.

Note: included for comparison with California migrations; see Calhoun (1952) for clarification of California pattern; also notes marked and understandable difference in view of many basic dissimilarities between coast lines.

Fishing Gazette
1939. Conservation of striped bass. Vol. 56, no. 2, p. 23.
Report of agitation by commercial and sport interests for uniform state laws regarding minimum size, maximum weight, closed seasons, range, habitat, adaptation to environment, food, movements, marking experiments.

Neville, W. C.
1939. Results of a survey to determine the importance of spawning grounds for striped bass. U. S. Fish and Wildlife Ser., Fish. Market News, vol. 1, no. 12, p. 4-5.
Atlantic coast observations of spawn and nursing grounds and of tagging program experiments in an attempt to determine effectiveness of regulatory measures.

United States. Department of Commerce. Bureau of Fisheries
1939. Bureau of Fisheries issues recommendations for striped bass conservation. Fish Serv. Bull. 287, p. 2-3.
Discussion of widespread eastern controversy occasioned by Memorandum I-83 recommendation that appropriate legislation should protect all striped bass under sixteen inches.

Hatton, S. R.
1940a. Progress report on Central Valley fisheries investigation, 1939. Calif. Fish and Game, vol. 26, no. 4, p. 335-373, 6 figs., 14 tbls., Appendix A-C.
Partial results of biological survey to determine effect on fish population of Central Valley Project; scope of investigation; spawning areas, seaward migrations, food preferences, size; notes insufficient water for normal migration; unscreened diversions, pumps and flood gates; pollution.

Note: augmented adaptation appears in *California Conservationist*, vol. 6, no. 5, 1941, p. 11, 22; as "Feeding habits of the striped bass and shad."

Hatton, S. R.
1940b. Striped bass. *California Conservationist*, vol. 5, no. 6, p. 4.
Report of epochal discovery by plankton nets of free striped bass eggs on San Joaquin side of Sherman Island during 1939 attempts to determine locality of spawn; description of eggs, temperature of water, drift of larvae.

Sumner, F. H. and O. R. Smith
1940. Hydraulic mining and debris dams in relation to fish life in the American and Yuba Rivers of California. Calif. Fish and Game, vol. 26, no. 1, p. 2-22, 10 figs.
Summary of 1938 biological survey report submitted to Corps of Engineers; physical features of rivers, history of mining and dams, distribution and records of fish, effect of debris dams and mining debris on fish and fish foods, natural erosion; concludes that renewed hydraulic mining only slightly detrimental to sport fishing.

Clark, G. H.
1941. Our introduced species of fish life. *California Conservationist*, vol. 6, no. 6, p. 20-21, 23 figs.
Economic appraisal of value of introduced species, comparison with native species.

Merriman, Daniel
1941. Studies on the striped bass (*Roccus saxatilis*) of the Atlantic coast. U. S. Fish and Wildlife Ser., Fish. Bull., vol. 50, no. 35, p. 1-77, 23 tbls.
Results of comprehensive investigation April, 1936-June, 1938; notes and comments on California thorough studies on life history and conservation and the non-applicability of that information to Atlantic coast, due to greatly differing fishery conditions; reports mass movement of Atlantic population north along coast in spring and back south in fall over great distances.
Note: included for comparison with California migrations; see Calhoun (1952) for clarification of California pattern; also notes marked and understandable difference in view of many basic dissimilarities between coast lines.

Hatton, S. R.
1942. Striped bass spawning areas in California. Calif. Fish and Game, vol. 28, no. 1, p. 65.
Incidental notes gathered on Central Valley fisheries investigation; habitat, salinity, temperature of water.

Shapovalov, Leo
1945. Pollution and fish mortality in Lower Salinas River, Monterey County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-27, 17 p., 1 fig. (Typewritten)
Report of survey occasioned by mass deaths of 1685 specimens; description of basin and river area; effects of war-time intensified pollution from vegetable processing plants, municipalities and Fort Ord; water diversion; improvement recommendations.

Calhoun, A. J.
1946. Observations on the striped bass fishery in the Sacramento delta area during April and May, 1946. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-12, 36 p., 6 figs., 3 tbls. (Typewritten)
Description of areas; seasonal fluctuation in fishing effort, average daily catch; length frequencies and sexual maturity, spawning areas and seasons; recommends no closed season during spawning time.

Woodhull, C. A.
1947. Spawning habits of the striped bass (*Roccus saxatilis*) in California waters. Calif. Fish and Game, vol. 33, no. 2, p. 97-102, 3 figs.
Review of data from earlier works; spawning observations near Venice Island in San Joaquin River, description of eggs.

Calhoun, A. J. and C. A. Woodhull
1948. Progress report on studies of striped bass reproduction in relation to the Central Valley Project. Calif. Fish and Game, vol. 34, no. 4, p. 171-181, 5 figs., 6 tbls., 1 color plate.
Outline of facts gathered during 1947, discussion of some problems anticipated in connection with construction of Delta-Mendota and Cross Channel pumping plants; methods, recoveries at tow net stations by area of eggs, larvae, and fry; growth rate of larvae and fry; distributional patterns, tidal flows and currents; description of channel area and projects; predicts sizable loss of small fish at Delta-Mendota pumping plant diversion, but in relation to total numbers of fry, no great reduction in population.
Note: appears as Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 47-18 (1947).

California. State Chamber of Commerce
1948. Water requirements of striped bass. *In* Water requirements of anadromous fishes. Research Rept., Sec. IC, p. 211-216.
Review of available information pertaining to effects of dams; brief discussion of introduction, extension of range, commercial and sports catch, abundance, tagging operations; effect on striped bass of proposed construction of Delta-Cross Channel and questions raised thereby.

Calhoun, A. J.
1949. California striped bass catch records from the party boat fishery: 1938-1948. Calif. Fish and Game, vol. 35, no. 4, p. 211-253, 23 figs., 16 tbls.
Description of party boat fishery, reporting, records, fishing effort; description and importance of areas and blocks in bay and river systems; seasonal patterns of fishing quality, recovery of tagged specimens, fluctuations in abundance; concludes that population maintaining itself, commercial exploitation unthinkable.
Note: appears as Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-6 (1948).

Curtis, Brian
1949. Striped bass. *In* The warm-water game fishes of California. Calif. Fish and Game, vol. 35, no. 4, p. 266-268, color plate no. 6.
General review of known facts and previous studies; geographic range, identifying characteristics; introduction, survival, protective legislation, method of fishing, spawning as described in Woodhull (1947), egg and young development, diet.

McCully, Howard
1949. Striped bass. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 51-53, 1 fig.
History of commercial and sport fisheries; exact repetition of Nidever (1937) on habits, extension of range, yearly catch and price; contains history of regulations.

Calhoun, A. J.
1950. California's striped bass; a transplanted "alien" now furnishes sport fishing for 10,000 Westerners; biologists seek to perpetuate him. *Outdoor West*, vol. 2, no. 3, p. 6-7, 28-29, 4 figs.
Introduction and success; history, importance and value of fishery; tagging program, population fluctuations, catch records, problems of water development projects.

Calhoun, A. J., C. A. Woodhull and W. C. Johnson
1950. Striped bass reproduction in the Sacramento River system in 1948. Calif. Fish and Game, vol. 36, no. 2, p. 135-145, 2 figs., 4 tbls.
Sampling methods and materials; eggs taken at stations along system, water temperature; spawning areas, habitat, patterns; effect of temperature on distance traveled upstream before spawn; concludes that spawn at 60° F., and not during storms.

Morgan, A. R. and A. R. Gerlach
1950. Striped bass studies on Coos Bay, Oregon, in 1949 and 1950. Oregon Fish Comm. and Oregon Game Comm., Report 246, 31 p., 21 figs., 5 tbls.
Detailed results of joint study of fish and fishery; historical treatment of commercial and sport fisheries of area; extent of fishing areas, seasons, creel census, commercial gear, relationship to shad, catch per unit of effort; spawning areas and habits, fecundity, tagging program, migratory patterns, rate of growth, fishing intensity; length-weight relationship, maturity, size and age, food habits; conditions affecting survival, economic evaluation; concludes that no evidence of depletion, no restrictive regulations needed; one spring migration for upstream spawn; second fall migration into slough; summer movement into ocean in large numbers, returning in fall.
See Calhoun (1952) for California migration pattern.

Loeber, T. S.
1951. A report of an investigation of the temperature and salinity relationships of striped bass (*Roccus saxatilis*) and salmon (*Oncorhynchus tshawytscha*) in connection with the Reber Plan. Calif. Dept. Fish and Game, Bur. Fish. Cons., Adm. Rept. 51-27, 40 p., 25 figs., 2 tbls. (Typewritten)
Effect of diet on temperature relationships, comparative iodine numbers and temperature tolerance of field and laboratory specimens, maximum temperature toleration, shock phenomenon.

Calhoun, A. J.
1952. Annual migrations of California striped bass. Calif. Fish and Game, vol. 38, no. 3, p. 391-403, 10 figs.

Attempt to clarify California picture outlining migrations within Sacramento River system and adjacent waters; description of tagging 2,136 large specimens and recovery of about 400; four season distributional charts; review of findings from other areas and dissimilarity between coastal lines; San Francisco and Coos Bay, Oregon, as only abundant areas because of extensive tidal estuaries desirable for nursery and wintering grounds; concludes fall mass movement into Sacramento-San Joaquin Delta fresh water, remaining during winter; spring dispersal over delta and tributary rivers to spawn; return for summer in San Francisco Bay and adjacent salt and brackish waters.
See Calhoun (1949), and Clark (1934, 1936).

Johnson, W. C. and A. J. Calhoun
1952. Food habits of California striped bass. Calif. Fish and Game, vol. 38, no. 4, p. 531-534, 2 tbls.
Analysis of 387 stomach contents collected on successive Saturdays, June 1947-June 1948; notes confirmation of bass' readiness to eat almost any available fishes and invertebrates of appropriate size; possible relationship between minor decline in bass abundance and progressive decrease in shrimp abundance; concludes that shrimp represent 53% and anchovy 39% of total summer volume.

Raney, E. C.
1952. The life history of striped bass. Bingham Ocean. Coll., Bull., vol. 14, art. 1, p. 5-97, 4 tbls., appendix.
Review of literature dealing with species and biology; notes on research project underway and recommendations for future research; summary of literature by category; distribution, general behavior and migrations, productions, food, age and growth, abundance, methods and economics of fishery, parasites, diseases and abnormalities.
Note: also contains the following: E. F. Tresselt, "Spawning grounds of striped bass or rock in Virginia," p. 98-110; E. H. Hollis, "Variations in feeding habits of striped bass in Chesapeake Bay," p. 111-131; V. D. Vladydov and D. H. Wallace, "Studies of striped bass with specific reference to Chesapeake Bay region during 1936-38," p. 132-177.

Calhoun, A. J.
1953. Distribution of striped bass fry in relation to major water diversions. Calif. Fish and Game, vol. 39, no. 3, p. 279-289, 10 figs., 4 tbls.
Summarization of survey results; distribution of 1951 fry in relation to threats to fishery; sampling methods; distribution during mid-July 1951; length; location of major diversions; estimations of 35,000,000 inch-long fry; notes efforts by Pacific Gas and Electric Company and Bureau of Reclamation; concludes that 25% of fish could be destroyed in absence of protective measures.

Skinner, J. E. and A. J. Calhoun
1954. Field tests of stainless steel and tantalum wire with disk tags on striped bass. Calif. Fish and Game, vol. 40, no. 3, p. 323-327, 3 figs., 2 tbls.
Devoted to evaluation of types of tags.

Outdoor California
1955. Poor striper spawning year causes concern. Vol. 16, no. 10, p. 4-5, 2 figs.
Results of spawning surveys; yearly averages and fluctuations, fishing pressure, industrial pollution, diversions.

Skinner, J. E.
1955. Observations on the shad gill net fishery in 1954, with reference to its effect on striped bass. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Dept. 55-3, 12 p., 3 figs., 10 tbls. (Processed)
Results of survey to obtain measure of relationship between striped bass sport fishery and shad commercial fishery; history of shad fishery, introduction, catch records 1916-1954, areas, seasons and value; history of striped bass fishery, introduction, catch, regulations; ratio of bass to shad in nets, bass mortality; concludes that opening of shad season precede principal run by full month; striped bass outnumbered shad in nets during earlier part of season; at height of shad run, striped bass comprised 12% of catch; estimated 90% bass net mortality in flats,

15% in channel; recommends April 10 beginning of shad season; complete closure of Honker and Grizzly Bays to all gill netting.

Note: see Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-2, Part VII for summarization of field observations.

Chadwick, H. K.

1957. Toxicity of Tricon Oil Spill Eradicator to striped bass (*Roccus saxatilis*). Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-4, 4 p., 1 tbl. (Processed)

Results of laboratory experiment requested by manufacturer of oil emulsifier; condition of specimens; methods and materials; concludes that eradicator toxic to striped bass.

Chadwick, H. K.

1958. A study of the planktonic fish eggs and larvae of the Sacramento-San Joaquin Delta with special reference to the striped bass (*Roccus saxatilis*). Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 58-5, 24 p., 2 figs., 9 tbls. (Typewritten)

Study to determine cause of discrepancy between growth rates reported by eastern and western biologists; methods and materials of surface plankton net operations, areas of collection; condition or eggs and larvae, possible spawning dates; temperature and salinity; concludes bass spawn in San Joaquin Delta late March-early June 1957; in Sacramento River late April-early June; more probable spawning in San Joaquin Delta regions; close relationship between spawning and water temperature; peak of shad spawning late May and early June in Feather and Sacramento Rivers above Sacramento.

STURGEON

Acipenser transmontanus

California Conservationist
1940. Sturgeon. Vol. 5, no. 5, p. 20, 1 fig.
History of fishery and depletion; effect of Chinese set line operations, carp and striped bass introduction; migration, spawning, predation.

Outdoor California
1940. Sturgeon on increase. Vol. 1, no. 8, p. 1.
Report of observation by trout planting crew on Klamath River.

Wales, J. H.
1946. Sturgeon from Shasta Lake. Calif. Fish and Game, vol. 32, no. 1, p. 31.
Notes appearance of specimens in newly formed lake on Pit River; size, weight, tumorous growth leading to death.

Outdoor California
1954a. Getting the facts on the sturgeon. Vol. 15, no. 11, p. 9, 2 figs.
Account of the Dingell-Johnson study in Sacramento-San Joaquin Delta to determine adequacy of protection; netting and tagging operations, jumping habits in San Pablo Bay, fishing methods.

Outdoor California
1954b. New season on the biggest fish of them all tempts California anglers. Vol. 15, no. 4, p. 1, 6, 1 fig.
Account of first sturgeon season since 1917 closure; history of protective legislation; description and size of specimens, maturity, length-weight-age relationships, habitat preference, migrations.

Pycha, R. L.
1956. Progress report on white sturgeon studies. Calif. Fish and Game, vol. 42, no. 1, p. 23-35, 6 figs., 3 tbls.
Results of tagging program in San Pablo Bay following April 1954 opening of season for first time in thirty-five years; designed to observe growth and to evaluate regulations of one-fish-per-day-bag limit, 40-inch size limit; methods of capture, tagging of 1003 specimens; length-frequency, size, migration, age composition and size of population; management implications, angler interest; estimates 11,154 total population in bay; indicates winter or spring upstream and summer downstream migration of larger individuals; recommends 50-inch minimum size limit based on Columbia River studies conclusion that females not mature before 11-12 years and on California study results that specimens attain 50-inch length in thirteenth year.

INLAND FISHES

GENERAL

Needham, P. R.

1938. A biological survey of Lake Arrowhead. *Calif. Conservationist*, vol. 3, no. 3, p. 18-49, 22-23.

Description of lake and area, vegetation present, temperature, tributaries; bottom plankton and drift foods; species present, fishing intensity, success and quality; production potentiality.

Wales, J. H.

1943. General report on Lake Almanor, Plumas County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 43-15, 31 p., 7 figs., tbls. in text. (Typewritten)

Progress report on changing fishery; description and history of lake and fishery; Almanor Hatchery operation, planting and survival, natural propagation; catch records by area, stocking record 1937-1943; notes species present as loch leven, rainbow, silver salmon, carp, catfish, large-mouthed bass; recommends yearly plant of 50,000 yearling rainbow, 100,000 advanced silver or king salmon; screening mouth of Prattville Tunnel; rescue work in tributaries.

Note: for general report on attempt to reduce number of carp by poisoning, see J. H. Wales, "Carp control works in Lake Almanor, 1941," Calif. Fish and Game, vol. 28, no. 1, p. 28-33 (1942).

Murphy, G. I.

1948. The effect of TDE on fish and on the plankton and littoral fauna in Lower Blue Lake, Lake County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-14, 33 p., 2 figs., 7 tbls. (Typewritten)

Results of experiment undertaken to control Clear Lake gnat and effect on fish and fish foods; description of lake and area, species present, physical and chemical data, plankton hauls; TDE treatment effects; stomach samples analyses; concludes decimation of littoral fauna; 86% reduction in plankton; TDE ¼ as lethal to fish life as DDT; recommends additional study on fish reactions; ascertaining of recovery rate of organisms; no emulsion concentration.

Douglas, P. A.

1951. Lake Wohlford, San Diego County, catch record analysis, 1947-48-49. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-20, 11 p., 3 tbls. (Typewritten)

Description of artificial reservoir, species present; methods of obtaining catch records, catch composition, angling intensity and success.

Murphy, G. I.

1951. The fishery of Clear Lake, Lake County, California. Calif. Fish and Game, vol. 37, no. 4, p. 439-484, 5 figs., 31 tbls.

General description and limnology; history of fishery, historical account of catch; species introduction, success, growth, length-weight tables; rough fish; affect of introduction of exotic carnivores, poor rainfall and irrigation practices; concludes that fishery little affected by angling; recommends 1950 restriction on fishing gear, moderate bag and possession limit.

Note: appears as Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-7 (1948).

Beland, R. D.

1954. Report on the fishery of Lake Havasu. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 54-17, 42 p., 8 figs., 23 tbls. (Processed)

River-reservoir system of lower Colorado River; description of drainage basin and lake formed by Parker Dam; physiochemical condition, limnology, history of lake and fishery, catch records, fishing pressure and success; species present; stocking and management recommendations.

Kimsey, J. B. and others
1956. A survey of the fish population of Pardee Reservoir, Amador/Calaveras Counties. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-18, 13 p., 2 figs., 3 tbls. (Processed)

First phase in plans to open reservoir to fishing; description and history of reservoir, water level fluctuation, basic fertility, limnology, population, species present, sampling methods; concludes existence of marginal habitat for trout; recommends large planting of largemouth bass; stocking of black crappie, white catfish, no stocking of trout.

Pintler, H. E.
1956. The 1954 fishery of Clear Lake, Lake County, California. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-2, 12 p., 1 fig., 4 tbls. (Processed)

General conditions; sports fishery intensity, success, quality; forage fishes, mortality, chemical control of gnat population, commercial fishery for carp; concludes that black crappie most important species, comprising 56.6% catch; bluegill 18.9%; largemouth bass 11.9%, decline of 16.3% from 1953 figure.

Kimsey, J. B. and C. J. Axelgard
1957. Economic value of warmwater sport fishing in California lakes and reservoirs. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-26, 23 p., 7 figs., 9 tbls. (Processed)

Methods and materials of sampling program; equipment, transportation, service and supply, food and lodging, license costs; concludes $12.60 average daily expenditure; $46,136,449 recreational value of 1955 statewide fishery.

Pintler, H. E.
1957a. A summary of the 1955 Clear Lake fishery, Lake County, California. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-27, 14 p., 6 tbls. (Processed)

Description and location of lake, history of investigation, water and weather conditions, species composition of catch; fishing effort, success, quality; forage fish, mortality, sport and commercial fishery trends; concludes that white catfish comprised 34.9% total catch; largemouth bass and crappie each 25%.

Pintler, H. E.
1957b. A summary of the 1956 Clear Lake fishery, Lake County, California. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-28, 18 p., 2 figs., 6 tbls. (Processed)

Description and location of lake; sports catch composition, angler effort and success per unit of effort, fishery trends, commercial fishery for carp and blackfish, mortality, status of forage fishes, requests for introduction of other species; concludes that bluegill and white catfish each comprised 40% total catch; largemouth bass 11%.

TROUT

Common rainbow *Salmo gairdneri irideus*
Golden trout *Salmo gairdneri aguabonita*
Lahontan trout *Salmo clarki henshawi*
Piute trout *Salmo clarki seleniris*
Brown trout *Salmo trutta*
Eastern brook trout *Salvelinus fontinalis*
Lake trout *Salvelinus namaycush*
Dolly Varden trout *Salvelinus malma*

Jordan, D. S.
1894. Salmon and trout of the Pacific coast. *In* Calif. Bd. Fish. Comm,. 13th Biennial Rept., p. 125-141, 10 pls.
Speciation, derivation of names, distribution, distinguishing characteristics, weight, length, habits, fishing areas and effort.

Evermann, B. W.
1906. The golden trout of the southern high Sierras. *In* U. S. Bur. Fish., Bull., vol. 25, p. 1-51, 40 figs., 8 tbls., 17 pls.
Description and location of streams and lakes in study area; species present, initial introductions and success, habitat preference, food items.

Juday, Chancey
1906. Notes on Lake Tahoe, its trout and trout-fishing. *In* U. S. Bur. Fish., Bull., vol. 26 (1906), p. 137-146, 6 tbls.
Description of lake, affluents, level variations, origin, temperature, transparency, vegetation and plankton; species size, abundance, breeding habits, food; hatchery operations.

Rutter, Cloudsley
1907. The fishes of the Sacramento-San Joaquin basin, with a study of their distribution and variation. U. S. Bur. Fish., Bull., vol. 27, doc. 637, p. 141-142, 1 tbl.
Description, abundance, habitat, locations of populations.

Snyder, J. O.
1912. A new species of trout from Lake Tahoe. U. S. Bur. Fish., Bull., vol. 32, (1914), doc. 768, p. 25-28, 2 tbls.
Description of rivers and lakes of Lahontan system; status, description and relationships of trout forms; detailed description of new species, *Salmo regalis.*
Note: also appears in *The Western Graphic*, no. 5, p. 2 (1913).
See Wales (1957) for reported extinction of species.

Ferguson, A. D.
1913. Trout and black bass planting and transplanting in the San Joaquin and south Sierra districts. Calif. Fish and Game Comm., Fish Bull. 1, p. 42-48.
Natural conditions in area, history of planting expeditions, description of lakes planted.

Ferguson, A. D.
1916. Extending the range of the golden trout. Pac. Fish. Soc., Trans. (Second Annual Meeting, 1915), p. 65-70.
Report of experiments in Fresno County mountains to determine origin of *Salmo roosevelti*; variation, coloration; notes 1896 transplanting to Kaweah River, and other early transplantings by individuals and state agencies drawing on Volcano Creek population; methods of packing; possibility hybridization; notes that presence in Kern River antedates rainbow existence and not descendant from rainbow.

Snyder, J. O.
1918. The fishes of the Lahontan system of Nevada and northeastern California. U. S. Bur. Fish., Bull., vol. 35, doc. 843, p. 70-86, 10 figs., 4 pls., tbls. in text.
History and description of lakes and rivers of system, distribution and relationships of species, system geology and relation to ichthyology, systematic description of species, habitat, migration.

Evermann, B. W. and H. C. Bryant
1919. California trout. Calif. Fish and Game, vol. 5, no. 3, p. 105-135, 16 figs.
Descriptions, field identification with habits, habitat, distribution.

Coleman, G. A.
1926. Conditions of existence of fish in Lake Tahoe and tributary streams. Calif. Fish and Game, vol. 12, no. 1, p. 23-27.
Physical condition of lake bottom, water temperature, zones of stagnation and circulation, available food supplies; hatchery development, fry distribution plans.

Follett, W. I.
1926. Prey of the versatile rainbow. Calif. Fish and Game, vol. 12, no. 4, p. 204.
Notes stomach content of three specimens taken in McCloud River: jumping mouse; mountain ash berry; 4½ inch bullhead and young vireo in pinfeather stage.

Coleman, G. A.
1927. Fishing conditions in Lake Tahoe. Calif. Fish and Game, vol. 13, no. 4, p. 261-264.
Results of an investigation to determine the cause of seasonal abundance; introduction of species and adaptation; breeding and feeding habits, habitat; notes segregation of native and introduced species and adaptation of each to particular proper environmental conditions.

Coleman, G. A.
1928. Biological requisites for lake trout. Calif. Fish and Game, vol. 14, no. 1, p. 45-47.
Typical trout lakes, environment, reproduction, food, predators and predation.

Shepherd, David
1928. The *Trichoptera* of Waddell Creek and their relation to the food of the rainbow trout, *Salmo irideus*. Stanford Univ., Ph.D. thesis, 149 p., 7 tbls., appendix with 25 pls., 2 maps. (Typewritten)
Review of literature; location, topography, humidity, vegetation of study area; methods and materials of collecting and rearing specimens; description and biology of aquatic fauna; analyses of fifty-five trout stomachs; concludes that insects constitute 88% total number organisms in stomachs; *Trichopterus* constitute 75.64% insects.

Coleman, G. A.
1929. The food of trout. Calif. Fish and Game, vol. 15, no. 1, p. 39-41.
Results of stomach analysis; selection of food, effect of age, cannibalism.

Davis, H. S., P. R. Needham and A. C. Taft
1933. California trout investigations; first annual report for the fiscal year, July 1, 1932 to June 30, 1933. U. S. Bur. Fisheries Report to Calif. Div. Fish and Game, 55 p., 17 photographs. (Typewritten) (Available at Calif. Dept. Fish and Game Library, Sacramento, California.)
Tentative summarization of field work; description and operation of Yosemite and Coastal Streams projects, Truckee River and Upper Angora Lake marking experiments, Hot Creek experimental pond and San Diego reservoir study; angling pressure, carrying capacity of streams; effects of irrigation and power diversions, partial closure to fishing; unknown effect of homing instinct; counting and marking, bottom foods collections, seasonal fluctuations and utilization of natural foods, practicability of food introduction.
See Needham and Taft (1936).

Lee, B. V. and J. O. Snyder
1933. New trout discovered in Sierra stream. *Pac. Sportsman*, vol. 14, no. 4, p. 2, 1 fig.
Brief statements and description of Piute trout, first published picture.
See Snyder (1933b, 1934a, 1934b).

Needham, P. R.
1933. The California trout investigations. Calif. Fish and Game, vol. 19, no. 2, p. 113-122, 9 figs.
Progress report on program of trout and environment; areas and subjects for study; food and shelter requirements, effect of hazards and pollutants.

Snyder, J. O.

1933a. California trout. Calif. Fish and Game, vol. 19, no. 2, p. 81-112, 15 figs., 4 color plates.

Distribution and range, native and introduced species; description, habits, habitat, conservation and importance; scale readings, color, food; barriers to migration, artificial propagation and distribution, predators.

See Wales (1957), p. 50-51, on extinct and invalid species.

Snyder, J. O.

1933b. Description of *Salmo scleniris*, a new California trout. Cal. Acad. Sci., Proc., 4th ser., vol. 20, no. 11, p. 471-472.

Characteristics of isolated variant of *S. henshawi*.

See Lee and Snyder (1933) and Snyder (1934a, b).

Curtis, Brian

1934. The golden trout of Cottonwood Lakes (*Salmo aguabonita* Jordan). Amer. Fish. Soc., Trans., vol. 64, p. 259-265.

Results of natural habitat studies in Inyo County; conditions in upper and lower lake systems and earlier classifications of species as *S. roosevelti* and *S. aguabonita*; June spawning runs, Mt. Whitney hatchery operations; spawning activity, description of eggs and young; growth, habitat; food preferences; concludes that all fish in Golden Trout Creek (Volcano Creek), South Fork of Kern and in Cottonwood Lakes should be *S. aguabonita*.

Note: adaptation of MA thesis, Stanford Univ., 1934; preliminary report appears as Calif. Div. Fish and Game, Inland Fish. Br., Adm. Rept. 33-1 (1933); further adaptation appears in Calif. Fish and Game, vol. 21, no. 2, p. 101-109, 1 fig. (1935).

Needham, P. R.

1934a. Notes on the food of trout. Calif. Fish and Game, vol. 20, no. 2, p. 119-127, 8 figs., 3 tbls.

Brief review of stomach content analysis from specimens taken in Waddell Creek, Merced River, Hot Creek; dominant foods.

Needham, P. R.

1934b. Quantitative studies of stream bottom foods. Amer. Fish. Soc., Trans., vol. 64, p. 238-247, 4 tbls.

Report of one aspect of California Trout Investigations field work; methods, distribution of foods in relation to stream width, types of bottom in relation to food amounts, seasonal distribution, wet weight per square foot in streams of varying widths; description, sampling, presence of foods; notes that winter conditions in California streams in no way comparable to northeastern states; concludes that at least as much if not more food present in winter than in summer in California inland and coastal streams.

Snyder, J. O.

1934a. A new California trout. Calif. Fish and Game, vol. 20, no. 2, p. 106-112, 4 figs.

Description, habitat, range of Piute trout (*Salmo scleniris*); Llewelyn Falls barrier in Alpine County separating population from Lahontan trout distribution.

See Lee and Snyder (1933) and Snyder (1933b, 1934a).

Snyder, J. O.

1934b. The new Piute trout. *Pac. Sportsman*, vol. 14, no. 9, p. 4, 14-16.

Description of sharply-defined habitat in Fish Valley behind Llewellyn Falls, relationship with other species; recounts details of expedition capturing and transporting specimens to Steinhart Aquarium.

See *Calif. Conservationist* (1937a, b), Lee and Snyder (1933) and Snyder (1933b, 1934a).

Taft, A. C.

1934. California steelhead experiments. Amer. Fish. Soc., Trans., vol. 64, p. 248-251.

Problems in management, differences between steelhead and rainbows; gradation in migratory habits largely limited by physical characteristic

of lake or stream; variation in habits among types, overlapping characteristics, production of eggs for hatchery use; notes opinion that trout of rainbow series all definitely migratory and no sharp dividing line separating steelhead from rainbow.

Needham, P. R.

1935a. Natural food of trout. Prog. Fish Culturist, Memo I-131, no. 10, p. 1-12, 4 tbls.

General description of various foods present in trout waters, followed by details of stomach analyses as part of California Trout Investigations; concludes that leaf hoppers and aquatic beetles 70.8% in diet of Merced River rainbow with true-flies 13%; snails and small clams 55.6% of Hot Creek loch leven and rainbow diet with shrimp 33.3%.

Note: see p. 8-11 for discussion of California findings.

Needham, P. R.

1935b. Stream survey work in California. *Pac. Sportsman*, vol. 15, no. 6, p. 6-7, 2 figs.

Operational features of three survey parties in Klamath, Sierra and Mono-Inyo National Forests; equipment for intensive biological, chemical and physical investigation of lakes and streams; notes conclusions that east slope of Sierra richer in food conditions than San Joaquin drainage; midges most important high Sierra lake food; over-stocking cause of poor fish condition in lakes; loch leven poorly adapted to cold water.

Needham, P. R. and H. A. Hanson

1935. A stream survey of the waters of the Sierra National Forest, California, 1934. U. S. Bur. Fish., 55 p., 12 tbls. (Processed)

Results of study to develop well-defined stocking policies and to determine how and where improvements might be made to increase productivity; equipment and methods; description of area surveyed and general observations of San Joaquin River; fishes present, effect of power developments, water fluctuations, fishing intensity and accessibility, stream bottom foods, stomach analyses; thermal and chemical character of lakes, stocking list; recommendations for improvements, checkdams, spawning areas, holding ponds, planting, bag and size limits.

Smith, O. R. and P. R. Needham

1935. A stream survey in the Mono and Inyo National Forests, California, 1934. U. S. Bur. Fish., 45 p., 11 tbls. (Processed)

Results of study to develop efficient stocking policy; equipment and methods; description of area surveyed; physiography; fishes present; bottom foods, fluctuations in volume, fishing intensity and accessibility, temperatures, chemical conditions, population studies, recommendations for planting, rearing pool sites, protective measures, stream and lake improvements.

Wales, J. H. and R. C. Lewis

1935. Progress report of trout feeding experiments. Calif. Fish and Game, vol. 21, no. 2, p. 110-112, 8 figs., 1 tbl.

Effect of certain foods and feeding methods upon health of fingerlings; hatchery care, preparation of food, mortality, growth; concludes that diet of abalone meal and beef liver obtain best results.

See Wales and Lewis (1936).

Gierlich, H. S.

1936. Report on the inspection and survey of fish dam sites in the drainage areas of South Fork of Silver Creek, Pyramid Creek, Desolation Valley, Echo Lake Canyon, Glen Alpine Canyon and Rubicon River located in the El Dorado National Forest, California. U. S. D. A., For. Svc., 38 p., 33 figs., 4 tbls., 5 pls. (Typewritten)

Daily report of survey to determine advisability of small storage dam construction to maintain fish life during dry seasons; description of area and individual waters, high water marks, grade of dam crest, tree and plant life, water flow, inlets and outlets; recommended construction and estimated costs.

Needham, P. R.
1936. The Hot Creek rearing ponds. Calif. Fish and Game, vol. 22, no. 2, p. 118-125, 4 figs., 2 tbls.
History of area development; food, habitat, experimental breeding; attempts at starting nonmigratory strain.

Needham, P. R. and A. C. Taft
1936. California trout investigations; second progress report for the period July 1, 1933, to December 31, 1935. U. S. Bur. Fish., Rept. to U. S. Comm. Fish. and Calif. Div. Fish and Game, 58 p., 16 tbls. (Typewritten)
Status of work in connection with major and minor projects reported in Davis, Needham and Taft (1933), and Convict Lake planting experiment, Beaver Creek screening experiment; introduction of water-flea (*Daphnia magna*) and isopod crustacean (*Asellos communis*) as food; stream and lake surveys, planting, legal restrictions, physical and biological improvements, artificial propagation aids, description of study area.
See Davis, Needham and Taft (1933).

Rayner, H. J.
1936. The caddis flies or *Trichoptera* of the western United States with life history studies of species on the University of California campus, Berkeley. M.A. thesis, Univ. Calif., 114 p., 1 fig., 12 pls. (Typewritten)
Results of studies of important trout food; description of larval, prepupal and adult habits.

Wales, J. H. and R. C. Lewis
1936. Progress report of trout feeding experiments. Calif. Fish and Game, vol. 22, no. 2, p. 105-117, 6 figs., 1 tbl.
Second report of experiment designed to improve type and method of feeding used in state hatcheries; description of fish and their care, preparation of types of food; growth and mortality.
See Wales and Lewis (1935).

California Conservationist
1937a. Piute trout development is programmed. Vol. 2, no. 5, p. 3, 14-15, 4 figs.
Description of proposed planting expedition to barren Leland Lakes, El Dorado County; first successful trout transplant in 1876; Piute species discovery in Fish Valley, Alpine County; species description, method and materials of transport.
Note: contains reproduction and excerpts from Snyder (1934b).
See *Calif. Conservationist* (1937b).

California Conservationist
1937b. Piute trout planting expedition completed. Vol. 2, no. 9, p. 21.
Brief report on expedition outlined in *California Conservationist* (1937a); notes removal of 200 adults and 200 fry from Fish Valley to Leland Lakes, loss of three fry crushed by ice.

Needham, P. R.
1937. Notes on the introduction of *Salmo nelsoni* Evermann into California from Mexico. Amer. Fish. Soc., Trans., vol. 67, p. 139-146, 2 pls.
Record of May 1937 planting of fifty yearling specimens for experimental brood stock purposes in efforts to develop nonmigratory type for planting; brief history and description of pure wild strain long prevented from seaward migration by barriers; high temperature tolerance; importance of hatchery specimens behavior after planting; presence of distinctive hump on back directly above preopercle at base of head.
Note: see Hubbs (1946) (in anadromous section) for invalidity of species.

Rayner, H. J.
1937. Notes on the food of trout of Yosemite National Park. Calif. Fish and Game, vol. 23, no. 2, p. 149-156, 13 tbls.
Stomach content analysis; effect of altitude.

Shapovalov, Leo
1937. Fresh-water fish culture in California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 37-2, 147 p., 6 tbls. (Typewritten)
General introduction and history of fishery management and administration; diversions, effects of mining pollutants, thermal and chemical

conditions, relation of oxygen and lake temperature, fish food supply, plant life, native and introduced species, description of drainage basins, fish cultural practices including source of eggs, methods of culture, conservation of spiny-rayed species and use of Cyprinidae, extent and operation of hatchery system, management problems; recommendations for planting, regulations, stream and lake improvement.

Snyder, J. O.

1937. On the planting of large trout in California. *Calif. Conservationist*, vol. 2, no. 2, p. 1-2.

Operation and construction of hatchery system, pollution, artificial and natural propagation.

Wales, J. H.

1937. Burney experimental stream report—July, 1937. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 37-3, 4 p. (Typewritten)

Number and species planting, description of stream sections, predation, survival and growth data; notes 17.3% rainbow fingerling survival; .67% eastern brook survival; natural predation cause of heavy mortality.

Wales, J. H. and William Berrian

1937. The relative susceptibility of various strains of trout to furunculosis. Calif. Fish and Game, vol. 23, no. 2, p. 147-148.

Results of subjecting fingerlings to disease; mortality, course of disease; concludes that all strains susceptible.

Wales, J. H. and Richard Bliss

1937. Progress report of trout feeding experiment, 1936. Calif. Fish and Game, vol. 23, no. 2, p. 138-143, 2 tbls.

Account of experiment to test value of dehydrated beef meal and the effectiveness of feeding meals mixed with liver; description of food, preparation and feeding, mortality, growth, cost.

Wales, J. H. and D. Evins

1937. Gestonosis, a gill irritation in trout. Calif. Fish and Game, vol. 23, no. 2, p. 144-146.

Discussion of relative susceptibility to water irritants of wild and hatchery-reared individuals; pollution by diatoms, algal forms, bacteria and protoza.

Curtis, Brian

1938. Report of reconnaissance trip to check dam sites on Ropi, Lower Toem, Desolation, Channel and American Lakes, in the Pyramid Creek drainage, El Dorado National Forest, El Dorado County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 38-9, 9 p., 6 figs., 2 tbls. (Typewritten)

Investigation of effect of proposed check dams; description of area; food and shelter conditions; concludes that fluctuations not detrimental to fish or food.

Dill, W. A.

1938a. A preliminary report on the Kern River between the mouth of the canyon and the intake of KR 3 Powerhouse above Fairview. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 38-8, 44 p., 15 figs., 4 tbls. (Typewritten)

Part of projected survey of entire river drainage to collect facts having direct bearing upon proposed black bass stocking; regional description, influences of powerhouses, fishing intensity; stream section volume, migration barriers, stocking, temperatures, bottom, cover, food.

Dill, W. A.

1938b. 1938 creel census at Stevens Creek. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 38-7, 8 p., 4 tbls. (Typewritten)

Report of work in Santa Clara County; tagged or marked fish recovered, scale sample collection, number and size of catch, relative numbers of species.

Needham, P. R.

1938. Trout streams: conditions that determine their productivity and suggestions for stream and lake management. Comstock Publ. Co., 233 p., 74 figs.

Description of fish and streams; predators, parasites, food habits, preferences and distribution; propagation methods, stocking policies, stream improvement; discussion of trout names, planting tables, organization and operation of stream and lake survey crews.

Needham, P. R. and E. H. Vestal

1938. Notes on growth of golden trout (*Salmo agua-bonita*) in two high Sierra lakes. Calif. Fish and Game, vol. 24, no. 3, p. 273-279, 2 figs., 2 tbls.

Data on growth rates following planting in Bright Dot and Bighorn lakes; description of lakes, plantings, average increments in weight and growth, food preferences.

Shapovalov, Leo

1938. Recommendations for management of Marin Municipal Water District reservoir lakes during the fishing season of 1938. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 38-2, 5 p. (Typewritten)

Report requested upon declining fishery; physical characteristics, stocking; recommends no additional brown trout plants.

Wales, J. H.

1938. Manual of California trout diseases. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 38-16, 78 p. (Typewritten)

Description, treatment, methods of examination, predisposing factors; symptoms, epidemiology, occurrences, pathology.

Wales, J. H. and M. Moore

1938. Progress report of trout feeding experiments, 1937. Calif. Fish and Game, vol. 24, no. 2, p. 126-132.

Fourth in series relative to Mt. Shasta hatchery; fingerling experiments, methods, foods, difficulties encountered, pollution; results verify previous findings that fresh meat contains a factor necessary to health and growth of trout.

Curtis, Brian

1939a. The Frog Lake (Nevada County) fishery in 1938. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 39-11, 9 p. (Typewritten)

Physical features and descriptions of private lake; numbers caught, size, length, weight; fishing intensity and effort; spawning, condition factor, stocking.

See Curtis (1939b, 1941, 1942, 1943a, 1944a, 1945, 1946, 1947) and Fraser (1948a) for other studies in series.

Curtis, Brian

1939b. The Frog Lake (Nevada County) fishery in 1939. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 39-12, 11 p., 1 fig., 2 tbls. (Typewritten)

Second in series devoted to experimental management practices; limnology, number of fish, fishing intensity and effort, species ratio, average length, spawning, growth rate.

See Curtis (1939a) for series listing.

Curtis, Brian

1939c. Reconnaissance of lakes near Ebbetts Pass highway. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 39-17, 13 p., 12 figs. (Typewritten)

Investigation to determine necessary improvements; description of lakes, fishing intensity and accessibility, stocking.

Curtis, Brian

1939d. Survival of fish after pack transportation. Calif. Fish and Game, vol. 25, no. 1, p. 45-46.

Report of experiment to determine effect of pack horse transport to planting areas; methods, size of fish, temperatures; results indicate no deleterious effect on rainbow, eastern brook or Loch Leven.

Curtis, Brian

1939e. Survival of transplanted piute trout. Calif. Fish and Game, vol. 25, no. 1, p. 46-47.

Derivation, protective measures; 1937 transplant of 400 specimens to Leland Lake in El Dorado County; inspection one year later indicated successful survival but no spawning.

Curtis, Brian
1939f. Trout planted from Mt. Tallac Hatchery in Lake Tahoe and tributaries in 1939, and tentative 1940 stocking program. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 39-19, 8 p., 2 tbls. (Typewritten)
Comparison of plantings and recommendations; number and areas planted.

Needham, P. R. and H. J. Rayner
1939. The experimental stream, a method for study of trout planting problems. Copeia, no. 1, p. 31-38, 1 fig.
Methods and equipment used at Convict Creek Experimental Stream; description of stream, physical plant, operating procedures, food studies, stocking, stocking policy, condition factors, allied problems.

Sack, Ivan
1939. A cooperative plan for development of water conservation facilities on tributaries of Lake Tahoe, Rubicon and American Rivers in the El Dorado National Forest, California. U. S. D. A., For. Svc., 22 p., 4 figs., 8 pls., 3 maps. (Processed)
Discussion of check dam sites; description and history of area, public use and value to civilization, fish stocking history, proposed developments and priority by water shed units; concludes that $7500.00 annual expediture required to complete eleven-year program for fifty-four lakes and streams.

Shapovalov, Leo
1939. Recommendations for management of the fisheries of the Eel River drainage, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 39-2, 43 p. (Typewritten)
Methods and material; description of area surveyed, species present, fishing intensity and accessibility, dams and diversions, barriers, effect of low water, pollution, fish cultural operations; concludes that stocking alone cannot maintain fishing level in coastal streams; high natural propagation; recommends fish rescue; stream improvement; pollution control; regulations.

Wales, J. H.
1939. General report of investigations on the McCloud River drainage in 1938. Calif. Fish and Game, vol. 25, no. 4, p. 272-309, 13 figs., 2 tbls.
Survey of general features of drainage systems, its history and future as regards trout; U. S. Fisheries Commission operations 1879-1888; egg collections, transplantations and distributions; description, habits and abundance of McCloud rainbow; fish other than rainbow, Dolly Varden, brook trout, Sierra golden, Sacramento pike, chub, sucker, bullhead; physiographical and biological features of river and tributaries; suggestions for improved management: number of rainbow planted in upper McCloud be increased and Loch Leven and brook decreased; tributaries planted exculsively with rainbow; no necessity of closed streams.

Wales, J. H. and Earl Leitritz
1939. Brood trout feeding report. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 39-21, 13 p. (Typewritten)
History of introduced and native species from McCloud River; description of foods and test groups; spawning, fertility and quality of eggs, cost of producing eggs.

Wales, J. H. and E. S. Lewis
1939. Progress report of trout hatchery experiments, 1938. Calif. Fish and Game, vol. 25, no. 2, p. 166-171, 1 tbl.
Continuation of work to determine necessity of clean troughs and practicability of meal pellet feeding to fingerlings; methods and control of experiment.

Curtis, Brian
1940. Lethal effect of Tremmie concrete on Upper Truckee trout during construction of new Myers Bridge. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-17, 3 p.
Summary of fish destruction, steps to eliminate.

Dill, W. A.
1940a. A biological survey of the Dinkey Creek drainage, Fresno County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-7, 34 p., 14 figs. (Typewritten)
Results of investigation to evaluate fishing conditions, work out stocking program and plan stream and lake improvement; description of area, flow, pools and shelter, spawning grounds, food available, fish loss in impermanent inlets and outlets.

Dill, W. A.
1940b. A preliminary report on Bass Lake, Madera County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-12, 38 p., 13 figs. (Typewritten)
Study resulting from demand for stocking and improvement following poor fishing; review of problem and recommendations for management; general description, fishery, species present, angling methods, physical and chemical conditions, temperature, oxygen, food productivity, natural propagation, predators and disease, mixed populations; diversions and spill of water, shelter, boating; concludes that only small percentage of available supply caught; natural propagation and survival good; water fluctuations, rising temperature, lack of cover, motor boating main causes spoiling fishery; recommends planting suitable real and artificial cover.

Dill, W. A.
1940c. A preliminary report on Hume Lake, Fresno County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-4, 26 p., 5 figs., 2 tbls. (Typewritten)
Investigation prompted by decline in catch records; general description and past history of lake; fishery, tributaries, physical and chemical condition, planting methods; recommends closure of Huckleberry Creek throughout season; certain stream and lake improvements; removal of rough fish; scattered plantings of rainbows only.

Needham, P. R.
1940. Production in inland waters. Sixth Pac. Sci. Cong., Proc., p. 353-358.
Brief article on needs for intelligent management; previous production figures in terms of angler catch and poison treatment; notes lack of quantitative evidence regarding effects of stream and lake closure in high Sierras.

Outdoor California
1940. Trout planted in Gull Lake. Vol. 1, no. 18, p. 1.
Rehabilitation experiment following poisoning; planting of 76,000 eastern brooks, live box tests.

Shapovalov, Leo
1940a. Report on a survey of a proposed planting base in Glenn County and certain waters in Glenn and Colusa Counties. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-14, 9 p. (Typewritten)
Study at request of Willows Sportsmen's Club to determine any improvement in distribution; description of area, proposed pond site, water temperature, spawning possibilities; recommendations for stocking.

Shapovalov, Leo
1940b. Report on four reservoirs in Napa and Solano Counties. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-13, 17 p., 5 figs. (Typewritten)
Description, physical characteristics, species present, temperature, migration and spawning, availability of fish, rearing ponds.

Shapovalov, Leo
1940c. *Salmonidae*. *In* The fresh-water fish fauna of California. Sixth Pac. Sci. Cong., Proc., p. 441-443.
Presents status of knowledge and problems of classification; original classification, nomenclature; development of names; notes that system of trinomial nomenclature in *Salmo* best show true relationships; effect of stocking, hybridization.

Snyder, J. O.
1940. The trouts of California. Calif. Fish and Game, vol. 26, no. 2, p. 96-138, 32 figs., 4 color pls.
Distribution and relationship, native and introduced species, habits, habitat, scale readings, coloration, special senses, food preferences, barriers to migration, hatchery and propagation efforts.

Vestal, E. H.
1940a. Creel returns and trout production at June Lake, Mono County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-6, 21 p., 3 figs., 5 tbls. (Typewritten)
Limnological studies, plankton hauls, species and numbers caught, seasonal fishing trends, weight, length, age group composition, planting, survival.

Vestal, E. H.
1940b. Report on the experiment for rough fish control in Gull Lake, Mono County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-20, 8 p. (Typewritten)
Experiment to relieve crowding of lake beyond point of productivity to anglers and unprofitable source of egg collection; description, methods and materials; notes that lake chubs (*Siphateles obesus*) responsible for crowding; chemical treatment; trout rescue, natural recovery, restocking; screening to prevent rough fish reintroduction.
Note: report on experiment success contained in Adm. Rept. 41-23 (1941).

Curtis, Brian
1941. The Frog Lake (Nevada County) fishery in 1940. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 41-5, 10 p. (Typewritten)
Fishing intensity, length, weight, size; concludes that eastern brook holding up well, rainbow increasing; decrease in average catch per hour; decrease in eastern brook size.
See Curtis (1939a) for series listing.

Dill, W. A.
1941. The Little Kern River drainage, Tulare County: progress report No. 1. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 41-21, 12 p., 1 fig. (Typewritten)
Area description and fishery, spawning grounds, stocking, stream closure; recommends no planting, permanent closure for spawning and nursery grounds.

Needham, P. R. and F. K. Sumner
1941. Fish management problems of high western lakes with returns from marked trout in Upper Angora Lake, California. Amer. Fish. Soc., Trans., vol. 71, p. 249-269, 2 figs., 7 tbls.
Results of experimental study 1934-1936; description of lake, ecological conditions, standing crops, organisms present; marking and planting of 7108 eastern brook specimens, screening of lake outlet, creel census, weight, survival, growth, age determination, predation; water temperatures, climatic conditions, fishes present, foods eaten, coarse fish present and possible problems; concludes forty-nine pound average wet weight of bottom foods; midge larvae, bristle worms and scuds dominant foods; aquatic organisms formed over 66% of diet; eastern brook dominant in catch; losses of planted population extremely heavy regardless of size; brown trout predation on planted specimens; recommends selective gill netting of brown population and removal of chubs.

Randle, A. C. and F. R. Cramer
1941. The Squaw Creek test stream. Calif. Fish and Game, vol. 27, no. 3, p. 172-184, 3 figs., 6 tbls.
Progress report of creel census, 1937-1940; description of creek, purpose of test, survival of planted and marked specimens, trout production, composition of catch; lists intensity results of 15,428 total catch analysis and indicates wild, naturally spawned fish furnished over 97% of take; artificial stocking not effective; recommends aiding natural propagation.

Smith, O. R.

1941. The spawning habits of cutthroat and eastern brook trout. J. Wild. Man., vol. 5, no. 4, p. 461-471, 4 pls.

Report of 1940 experiments in controlled stream sections of Convict Creek; methods of observation and photography; definition and description of redd and egg pit, trapping and distribution of specimens, spawning periods, number of eggs left in females; spawning activities, courting, digging and testing, territoriality, deposition of eggs and diffusion of milt, egg-laying cycle, post-spawning behavior; opportunity for egg predation, guarding of completed redd, overlapping of redds; notes territoriality of both species, deferred combat of eastern brook females, different but biologically beneficial methods of egg covering, no egg predation.

Note: first published account of difference between species' spawning habits.

Soule, S. M.

1941a. A creel count on Big Creek and Rush Creek, Kings River drainage, Fresno County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 41-9, 2 p. (Typewritten)

Fishing area and intensity, size; concludes that rainbow best for streams in question; natural propagation good.

Soule, S. M.

1941b. A survey of the Big Creek drainage of the Kings River system, Fresno County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 41-20, 13 p., 1 fig., 4 tbls. (Typewritten)

Description, location, accessibility; character of drainage basin, fish, improvement and stocking recommendations.

Calhoun, A. J.

1942. The biology of the black-spotted trout (*Salmo clarki henshawi* Gill and Jordan) in two Sierra lakes. Ph. D. dissertation, Stanford Univ., 218 p., 31 tbls., 27 pls. (Typewritten)

Report of investigation in restricted region centering around Markleeville, Alpine County; description of Blue and Heenan lakes, physiochemical relationships, temperature, dissolved oxygen, pH, bottom fauna, aquatic plants, plankton; scale reading evaluation, periodicity of annuli and circuli, growth rates, spawning runs size, composition and percentage; length-weight relationship; spawning mortality, second-time spawners, artificial reproduction; catch records, marking experiments; feeding habits; concludes most rapid growth in spring and early summer; spawning runs ascend creeks over ten-day period shortly after ice melts; most do not spawn more than once; size of run not increased as result of closure and stocking; natural reproduction in Upper Blue Lake very ineffective; indicated population cycle with five or six year frequency; hatchery fish must furnish most population.

Note: also appears as Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-23 (1942).

See Calhoun (1944a, b) for adaptations.

Curtis, Brian

1942. The Frog Lake (Nevada County) fishery in 1941. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-7, 10 p. (Typewritten)

Continuation of experimental stocking program.

See Curtis (1939a) for series list.

Dill, W. A.

1942. Sugar Pine Lake, Madera County, California: report No. 1, Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-9, 22 p., 4 figs., 2 tbls. (Typewritten)

Location, history, description; water chemistry, winter conditions, food quality, condition of population, spawning and nursery grounds; concludes ideally suited for Loch Levens; fishery stands up under heavy pressure; fly fishing good; self-regulating character of population; recommends controlled stocking of inlet stream; establishment of similar lakes.

Dill, W. A. and Chester Woodhull

1942a. The Tule Indian Reservation creel count, 1941. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-11, 43 p., 5 figs., 11 tbls. (Typewritten)

Report of stream survey and of cooperative program between State and Tribal Council; description of area, main stream and dam; count methods, materials and mechanics; species present and distribution; fishing intensity and effort; average catch; concludes that hatchery fish comprised only 2.76% total catch; planting locality not effective; south fork Tule River and tributaries very productive of naturally spawned trout; continued satisfactory production without stocking; no practical value of past stocking; recommends future management program.
See Dill and Woodhull (1942b) for continuation.

Dill, W. A. and Chester Woodhull

1942b. The Tule Indian Reservation creel count, 1942. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-24, 32 p., 3 figs., 10 tbls. (Typewritten)
Continuation of program detailed in Dill and Woodhull (1942a); results of sample days; notes identical conclusions; no real deterioration of fishery but suggests increased fishing intensity may affect unless other measures taken.

Dill, W. A. and Chester Woodhull

1942c. Upper Salinas Reservoir, San Luis Obispo County, Report No. 1. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-20, 27 p., 5 figs., 6 tbls. (Typewritten)
Preliminary report of brief survey to determine fish-stocking suitability; location, description, use, ownership of dam and reservoir; fluctuation, bottom composition, aquatic plants, physical and chemical conditions, potential spawning areas; concludes that dam forms complete trout run barrier; good food production; spawning grounds available; reservoir possesses some "trout lake" qualities but more as "bass lake"; recommends obtaining more water temperature and dissolved oxygen content data; possible trial rainbow-steelhead stocking and if unsuccessful then large-mouthed bass and sunfish.

Murphy, G. I.

1942. Relation of the fresh-water mussel to trout in the Truckee River. Calif. Fish and Game, vol. 28, no. 2, p. 89-102, 5 figs.
Habitat, enemies, breeding seasons, parasitic period, post-parasitical life of *Margaritifera margaritifera fulcata* (Gould); affect on trout, mortality; suggests placing trout in rearing ponds after glochidia season over.

Shapovalov, Leo

1942. Creel census at Stevens Creek and Stevens Creek Reservoir, Santa Clara County, May 1, 2, and 3, 1942. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-15, 16 p., 3 figs., 1 tbl. (Typewritten)
Report on area providing large amount of fishing and good study material for stocking and management problems; character, number and distribution of anglers; fishing intensity, size, age; recommends marking of planted specimens.

Vestal, E. H.

1942a. Preliminary report on proposed improvement of Silver Lake, Mono County, fishery. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-19, 4 p. (Typewritten)
Area description, water depth, cover, tributary flow control by power company; history of fishery and species, effect of Loch Leven seasonal migration and cannibalism; recommends fish screen installation and gill netting to control Loch Levens; no stocking with rainbow; fertilization of lake; plant bed improvement; cold water diversion.

Vestal, E. H.

1942b. Report on the Gull Lake fisheries program for 1941. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-18, 14 p., 8 tbls. (Typewritten)
Observations on restoration following timbo powder treatment; rates of gill net catch, average angler catch, reaction to winter conditions; growth rate and condition of eastern brook specimens, seasonal changes in food habits; limnological changes, plankton production.

Vestal, E. H.

1942c. Report on the Gull Lake, Mono County, creel census for 1942. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-31, 4 p., 1 tbl. (Typewritten)

Summary of activities, estimated total catch, age group return.

Vestal, E. H.

1942d. Report on the improvement of a fish barrier in Upper Robinson Creek, Mono County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-25, 3 p., 2 figs. (Typewritten)

Location, description, origin and removal of log dam; notes that fish able to migrate upstream for spawning and that planted fish able to distribute more evenly.

Wales, J. H.

1942a. Ballard Reservoir poisoning. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-30, 6 p. (Typewritten)

Report of cube treatment by request of Alturas area sportsmen to eliminate chub (*Siphaletes bicolor*) and catfish (*Ameiurus nebulosus*) in order to rehabilitate for trout; description of area, methods and materials; concludes good natural reproduction of rainbow in Toms Creek; Loch Leven not suited; large initial plant of yearling rainbow will maintain fishery despite future introduction of other species.

Note: brief notes on rehabilitation appear in Calif. Fish and Game, vol. 29, no. 2, p. 83 (1943), and Calif. Fish and Game, vol. 30, no. 1, p. 61 (1944).

Wales, J. H.

1942b. Brood stock selection—preliminary tests. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-16, 11 p., 14 figs. in appendix. (Typewritten)

Operation of Mt. Shasta hatchery, preference of egg size, losses.

Wales, J. H.

1942c. Progress report of the 1941 Squaw Creek creel census. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-14, 15 p., 4 figs., 7 tbls. (Typewritten)

Total anglers, species caught, angling effort; length, weight, size; productivity of stream sections, stocking and recovery of marked specimens, possible movements into Pit River and out of census area, possible development of non-migratory strain.

Curtis, Brian

1943a. Fisheries aspects of South Fork of Stanislaus stream flow maintenance surveys. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 43-8, 8 p., 1 fig. (Typewritten)

Results of survey of storage potentialities of river above Lake Strawberry; improvements, effect of warm surface water, water level fluctuations, intensive summer swimming and boating on lake; Upper Pinecrest, Big Dam, check dams, Cooper Meadows projects.

Curtis, Brian

1943b. The Frog Lake (Nevada County) fishery for 1942. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 43-1, 10 p., 4 pls. (Typewritten)

Continuation of program; fishing intensity and effort; length, weight, growth, recovery of marked specimens; notes marked decrease in eastern brook proportion and marked increase in Loch Leven; recommends planting 15,000 eastern brook for future program.

See Curtis (1938a) for series list.

Dill, W. A.

1943. A fisheries survey of the Upper Bear Creek drainage, Fresno County, California. Calif. Div. Fish and Game, Bur. Fish and Cons., Adm. Rept. 43-5, 129 p., 27 figs. (Typewritten)

Report of cooperative venture between State and Fresno County Sportsmen's Club to survey and stock barren waters of county; description of drainage system, fishery, lakes and streams; physical characteristics, water temperature and chemistry, aquatic plants, food, spawning grounds and seasons, species present, winter conditions; accessibility, fishing methods, season and intensity; past stocking success, legislation,

improvement work; concludes that improvement work of small importance; no additional restrictive legislation needed; additional stocking with wild goldens helpful.

Note: recommendations for specific management for each individual water in drainage, p. 52-126.

McCloud, George

1943. Golden trout propagation in California. Calif. Fish and Game, vol. 29, no. 4, p. 191-195, 2 figs., 1 tbl.

Original distribution, transplantings; procedures at Cottonwood Lakes, summary of propagation efforts at Mt. Whitney Hatchery.

Needham, P. R. and F. K. Cramer

1943. Movement of trout in Convict Creek, California. J. Wild. Man., vol. 7, no. 2, p. 142-148, 2 figs., 1 tbl., 1 pl.

Report of data gathered by means of 1940 two-day trapping; description of drainage basin, effect of dam construction at head of Owens River Gorge, original barren character and introduction of species; construction and location of trap; kinds, numbers, size trapped; time, rate, direction of movement, effect of water temperature and flow volume; notes variance of results with similar studies in Michigan; concludes heavy downstream movement of *Salmo trutta*, peak occurring in week of May 11-18; slight upstream movement of all species; no apparent correlation between movement and water temperature; coincidence of movement with rising stream flow; sexual immaturity of migrants; lack of adequate food and shelter in upper stream reaches may be important initiating factors of movement.

Vestal, E. H.

1943. Creel returns from hatchery trout in June Lake, California. Calif. Fish and Game, vol. 29, no. 2, 51-63, 4 figs., 11 tbls.

Record of 1939-1942 study to obtain yield data on fish plants; description of environmental factors, history of plantings, markings; returns per angler and per hour; age-length-weight relationships, survival, condition of population.

Wales, J. H.

1943a. Poisoning of Cave Lake, Modoc County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 43-14, 3 p., 1 fig. (Typewritten)

Description of lake, depth, temperature, fluctuations, vegetation, species killed; notes evidence of natural spawn; recommends stocking with 2,000 yearling rainbow.

Wales, J. H.

1943b. Poisoning of Lily Lake, Modoc County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 43-13, 3 p., 1 fig. (Typewritten)

Notes attempt to rehabilitate; description of area, water temperature, depth, estimated number and species killed; recommend stocking with 3,000 yearling rainbow.

Calhoun, A. J.

1944a. Black-spotted trout in Blue Lake, California. Calif. Fish and Game, vol. 30, no. 1, p. 23-42, 9 figs., 10 tbls.

Results of scale studies and marking experiments 1940-1941; description of lake system; size and composition of spawning runs; after-effects of spawning; status of natural reproduction, spawning facilities of tributaries; concludes that heavy annual introduction of fingerlings, coupled with fishing closure, leads to overpopulation and depletion of food supply.

Note: adapted from Ph.D. thesis, Stanford Univ.; for thesis content, see Calhoun (1942); for adaptation of food habits section, see Calhoun (1944b).

Calhoun, A. J.

1944b. The food of the black-spotted trout (*Salmo clarkii henshawi*) in two Sierra Nevada lakes. Calif. Fish and Game, vol. 30, no. 2, p. 80-85, 4 figs.

Description of lake system, stomach content analysis.

Curtis, Brian

1944a. The Frog Lake (Nevada County) fishery in 1943. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-2, 10 p., 5 tbls. (Typewritten)

Continuation of stocking program; seasonal fishing intensity and effort; numbers and species caught, length, weight, growth, scale readings, markings; recommends planting of 15,000 fingerling rainbow.

See Curtis (1939a) for series list.

Curtis, Brian

1944b. A reconnaissance of check dam sites of the Carson River drainage in Alpine County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-12, 13 p. (Typewritten)

Attempt to locate potential sites to store water to assist low water level during summer; detailed description of area; notes absence of possible sites of sufficient storage capacity.

Dill, W. A.

1944a. The effect of a tungsten mill's tailings on bottom foods. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-10, 3 p., 1 tbl. (Typewritten)

Studies on abundance of fish foods at Cedar Creek, Kern County; methods and materials; description of area, average per square foot of organisms; concludes marked depletion of food; riffle areas covered by tailings; pools filled in; recommends no planting until detrimental conditions removed and productivity resumed.

Dill, W. A.

1944b. A preliminary survey of the Big Creek below Huntington Lake, Fresno County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-26, 12 p., 1 fig. (Typewritten)

Partial results of request to stock; past stocking; description of stream spawning areas, water flow, diversions, accessibility; concludes that study area deserves some stocking.

Lewis, R. C.

1944. Selective breeding of rainbow trout at Hot Creek Hatchery. Calif. Fish and Game, vol. 30, no. 2, p. 95-97, 1 fig., 2 tbls.

Maturity, average number of eggs, potentials of selective breeding of brood specimens.

Needham, P. R. and D. W. Slater

1944. Survival of hatchery-reared brown and rainbow trout as affected by wild trout populations. J. Wild. Man., vol. 8, no. 1, p. 22-36, 3 figs., 6 tbls.

Presentation of data obtained 1939-1942 from experimental plantings at Convict Creek by sampling total population; description and location of area, native and introduced species; methods and materials of operation in stream sections, stocking policy; food requirement ratio, mortality, length, weight, specific differences in survival, effect of winter condition, methods of analysis of competition; notes need for drastic revision in former stocking tables and mortality rates; notes that most effective use of hatchery fish either for creel in heavily fished waters or natural reproduction in lightly or moderately fished or barren suitable waters; indicates error in concept of economy of planting small fish to obtain adequate creel returns; concludes that because of competition and predation, fingerling trout of practical size cannot possibly provide significant addition to creel when planted in streams abundant with wild populations; greatest proportion of catch supplied by natural propagation; heavy over-winter loss of naturally propagated in first year.

Shapovalov, Leo

1944a. Creel census at Stevens Creek and Stevens Creek Reservoir, Santa Clara County, May 1 and 2, 1943. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-23, 14 p., 2 tbls. (Typewritten)

Continuation of program; estimated total number anglers, catch per angler and per hour, character of fishing; weather and water temperature; condition of fish caught.

Shapovalov, Leo

1944b. Creel census at Stevens Creek and Stevens Creek Reservoir, Santa Clara County, May 1, 1944. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-24, 23 p., 5 tbls. (Processed)

Description of annual program; management and stocking problems, role of increased number of goldfish.

Shapovalov, Leo

1944c. Preliminary report of the fisheries of the Santa Maria River system, Santa Barbara, San Luis Obispo and Ventura Counties, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-15, 11 p., 2 tbls. (Typewritten)

Location and description of area, physiography, climate, vegetation, stream flow, development, species present; resident steelhead, crosses with interior stock rainbow; spawning areas, fishing, stocking.

Smith, O. R.

1944. Returns from natural spawning of cutthroat trout and eastern brook trout. Amer. Fish. Soc., Trans., vol. 74, p. 281-296, 1 fig., 4 tbls.

Report of 1940-1943 experiment at Convict Creek station to determine numbers of fingerlings produced by eggs from Heenan Lake, Alpine County, and Little Walker Lake, Mono County; description of stream sections, materials and methods; spawning date, numbers of female and male spawners, estimated egg deposition, recovered fingerlings, competitive and predator fish, survival; concludes that most mortality occurs after emergence from gravel; straight-line relationship between number of eggs and fish length; 40-50% survival to fingerling size of eastern brown, covering eggs much more carefully than cutthroat.

Wales, J. H.

1944a. Castle Lake report for 1943. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-4, 62 p., 7 figs., 18 tbls. (Typewritten)

Summary of angling data, intensity and effort, creel analyses, stocking record of marked specimens, survival, length, weight, food; notes that 7% of anglers caught over 50% total catch; concludes that lake almost completely dependent upon hatcheries for fishery and capable of yield of approximately forty-five catchable rainbow per acre; $6.82 cost per acre per year to maintain.

See Wales (1946, 1947a, 1957) and Wales and German (1956).

Wales, J. H.

1944b. Diversion of water from Pit River to the P. G. & E. Pit 5 Power House. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-6, 15 p. (Typewritten)

Biological effect of diverting almost entire river flow for power development; description of river, drainage area, discharge; temperature, flow, physical and biological character of stream sections; rescue work, stranded specimens; species present, natural propagation; concludes that diversion would have great effect on volume-temperature relationship and greatly decrease population.

Wales, J. H.

1944c. Fresh ocean fish as a trout diet. Calif. Fish and Game, vol. 30, no. 1, p. 43-48.

Results of experiment at Mt. Shasta hatchery to trace trout disorder; method of food preparation, deficiency disease in trout not receiving fish; concludes that diet safe and produces healthier and more vigorous specimens than solely meat diet.

Curtis, Brian

1945a. Fishery problems of the reservoirs of the San Diego city water supply. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-28, 28 p., 6 figs. (Typewritten)

Report of preliminary survey; history and status of fishery, average yield; description of individual waters; remedial measures, stocking recommendations and regulations.

Curtis, Brian

1945b. The Frog Lake (Nevada County) fishery in 1944. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-3, 9 p., 5 tbls. (Typewritten)

Continuation of series to determine which species offers best fishing; angler intensity, effort, success; number and species caught; effect of war restrictions; notes increase in Loch Leven proportion of catch; slight decrease in eastern brook and marked decrease in rainbow; recommends 15,000 plant of rainbow yearlings.

See Curtis (1939a) for series listing.

Curtis, Brian
1945c. Reconnaissance of Cedar Creek, San Diego County, with reference to stream improvement possibilities. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-16, 7 p., 1 fig. (Typewritten)
Area description; dams, surface foods, spawning gravels, nonutilized nature of population, possible beaver introduction.

Curtis, Brian
1945d. South Fork of American River creel counts at opening of 1945 season. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-17, 6 p. (Typewritten)
Fishing intensity and effort, recovery of planted and marked specimens.

Dill, W. A.
1945a. The fishery of Millerton Lake, Fresno/Madera Counties; progress report no. 1: the creel counts of May 29 and 30, 1945. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-15, 26 p., 3 figs., 2 tbls. (Typewritten)
Description of area, potentialities, stocking history; size of specimens caught, fishing conditions, methods and intensity.

Dill, W. A.
1945b. The Little Kern River drainage, Tulare County: progress report no. 2. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-29, 23 p., 2 figs. (Typewritten)
Extent of drainage, fishing pressure, species present, stream character; natural propagation; stocking recommendations; concludes no necessity of stocking any streams with hatchery fish; should stock upper section of Pistol Creek with wild *aqua-bonita*; recommends desirability of preserving purity of native Little Kern golden trout from mixture.

Dill, W. A.
1945c. A report on the proposed diversion of water from tributaries of the South Fork of the San Joaquin River, near Florence Lake, Fresno County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-22, 19 p., 13 figs. (Typewritten)
Effects of contemplated storage and diversion; description; distribution and abundance of species present; potentialities of stream section below lake.

Dill, W. A. and J. H. Wales
1945. The fishery of Shasta Lake, Shasta County, California: Report No. 1, a preliminary account. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-8, 149 p., 12 figs., 9 tbls., Appendix I-V. (Typewritten)
Discussion of potential fishery in reservoir formed by new Shasta Dam; emphasizes suggestive rather than definitive nature of report; previous studies; description, physical features, uses of dam and reservoir; tributaries; game, forage and rough species present; effect of dam on migratory species; fishery, intensity, water utilization, temperature, chemistry; temperature-oxygen relationship; silt, turbidity, pollution; food productivity, natural propagation, predation, competition, shelter, effect of recreational uses; past and future stocking, lake and stream improvement; concludes that dam reduced stream fishing area of major tributaries by 86 miles, did not eliminate much good fishing area; 1944 sports fishing confined to trout at upper ends of reservoir arms near big tributary mouths; great water level fluctuation expected with destruction of bottom foods and adverse effect on spawning in some years; apparent copper pollution from mine tunnel drainage; lake supplied with excellent spawning streams; carp as detrimental to and squawfish as competitor of trout; lake not particularly suited for trout or bass; recommends rainbow plants in lower portions of tributaries prior to introduction of largemouth bass and bluegill if demanded.

Needham, P. R., J. W. Moffett and D. W. Slater
1945. Fluctuations in wild brown trout populations in Convict Creek, California. J. Wild. Man., Vol. 9, no. 1, p. 9-25, 1 fig., 7 tbls.
Report of 1939-1944 periodic samplings in closed and open sections; description of sample areas; methods and materials; effect of eliminating grazing; sources of error, migration from sample area, sampling method, estimation of weight from coefficient of condition, age determination

from length frequency distributions; relative importance of water depth, volume and shelter; spawning conditions, areas, activities, incubation, hatching; over-winter loss of first-year size, effect of relative severity of winter conditions; angling mortality, pressure; combined losses; size limits, weight loss, effect of closure to angling; notes variance of results with Michigan stream studies regarding relative importance of water depth and volume and shelter available; concludes that annual average natural reproduction of 2,750 fish per mile of stream; variable survival conditions rather than number of produced young determine number of catchables; 60% average over-winter loss, correlated with severity of conditions; section open to fishing average 3,818 fish per mile, closed section 5,438; stocking of 2,700 six-inch fish required to equalize sections.

Shapovalov, Leo

1945. Creel census at Stevens Creek and Stevens Creek Reservoir, Santa Clara County, California, May 1, 1945. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Dept. 45-12, 24 p., 7 tbls. (Typewritten)

Report in continued series of annual opening day census; angler intensity, effort, success; numbers, size, composition of catch.

Wales, J. H.

1945. Castle Lake report for 1944. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-14, 83 p., 6 figs., 18 tbls. (Typewritten)

Description of area; angling data, creel census, age group composition, survival, stocking record of marked species, estimated numbers; plankton abundance, bottom food samples, temperature and oxygen data, predatory birds; concludes that survival of planted yearlings much greater than fingerlings.

Bucklin, F. E.

1946. A creel census at Clear Creek, Lassen County, May 30, 1946. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-11, 11 p., 1 fig., 4 tbls. (Typewritten)

Opening day census in stream dominated by brown trout despite five years of heavy rainbow plants; physical character of creek, food conditions, species present, previous stocking history; catch composition, length, weight, age, sex; notes prevailing prejudice against browns; high natural propagation and survival; recommends discontinuance of rainbow plants and aiding browns in suitable waters.

Calhoun, A. J.

1946. Annual creel census, Truckee River, May 1, 1946. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-7, 11 p., 6 tbls. (Typewritten)

Description of census and results; length, sex and sexual maturity composition of catch; fishing intensity and success.

Curtis, Brian

1946. The Frog Lake (Nevada County) fishery in 1945. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-6, 15 p., 1 fig., 4 tbls. (Typewritten)

Continuation of program; notes low rainbow survival in competition with eastern brooks and Lochs; recommends 15,000 planting of rainbow yearlings.

See Curtis (1939a) for series listing.

Evans, W. A.

1946. Reconnaissance of Upper Sweetwater River, San Diego County, with reference to stream improvement possibilities. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-14, 10 p., 3 figs. (Typewritten)

Location, description of area; fishing pressure; flow, temperature, food, shelter, requirements; natural reproduction evidence.

Mears, Joe

1946. Sierra pot of gold. *Field and Stream*, vol. 51, no. 7, p. 40-41, 116-117, 5 figs.

History of golden trout stocking, description of area, fishing pressure and quality, regulations.

Murphy, G. I.

1946a. Observations on Conn Valley Reservoir, Napa County, on July 18 and August 3, 1946. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-18, 9 p., 6 figs. (Typewritten)

Temperature, oxygen determination, concentration of species.

Murphy, G. I.
1946b. A survey of Stony Creek, Grindstone Creek and Thomes Creek drainages in Glenn, Colusa and Tehama Counties, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-15, 28 p., 27 figs. (Typewritten)
Description of area; waters suitable for trout, species present, fishery pressure, stocking requirements; food supply, cover, shade, temperatures; rough fish; possible hatchery or rearing pond sites; planting recommendations.

Shapovalov, Leo
1946. Creel census at Stevens Creek and Stevens Creek Reservoir, Santa Clara County, May 1, 1946. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-8, 41 p., 11 tbls. (Typewritten)
Continuation of program; character of angling, weather and water; fishing intensity and success, recovery of marked species; length, weight, growth of species; stocking and rescue recommendations.

Shaw, P. A.
1946. Oxygen consumption of trout and salmon. Calif. Fish and Game, vol. 32, no. 1, p. 3-12, 3 figs., 6 tbls.
Details of experimental work undertaken at four hatcheries in 1933 and 1934; methods, minimum water requirements.

Vestal, E. H.
1946. Report on fertilization test with Lower Virginia and Trumbull Lakes, Mono County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-20, 11 p., 4 tbls. (Typewritten)
Results of attempt to restore productivity following snowslide; description of lakes, test program and fertilization procedure, fishery samples, bottom samples, plankton.

Wales, J. H.
1946a. Castle Lake trout investigation; first phase: interrelationships of four species. Calif. Fish and Game, vol. 32, no. 3, p. 109-143, 10 figs., 15 tbls.
Partial results of investigation to determine most suitable species to plant; description of area, census and limnological methods; catch, yield; predatory fish, birds, garter snakes; disease, escape by outlet stream; growth, condition, description, habits, food of species.
See Wales (1944a, 1947a, 1957) and Wales and German (1956).

Wales, J. H.
1946b. Historical notes on the rainbow and Dolly Varden trout. *Covered Wagon*, vol. 6, no. 1, p. 29-30.
History and operation of Baird Hatchery and Crook Creek egg collecting station, egg and fry shipments, origin of Dolly Varden name.

Woodhull, Chester
1946. A preliminary investigation of the Mokelumne River from Tiger Creek to Pardee Reservoir. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-16, 28 p., 13 figs. (Typewritten)
Results of biological survey necessitated by proposed P. G. & E. developments and improvements; physical and biological character of river; food supply, shelter, flow; accessibility to fishermen; probable affect of power system on flow, fish screen and ladder projects; concludes that fishery can be maintained by minimum release of 15 c.f.s.; no benefit derived from screening or ladders.

Curtis, Brian
1947. The Frog Lake (Nevada County) fishery in 1946. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 47-8, 21 p., 1 fig., 3 tbls. (Typewritten)
Continuation of program, catch composition, fishing intensity and success; notes complete catch dominance of Loch Levens; long survival and persistence; recommends gill netting of large predatory Lochs; planting of 15,000 rainbow.
See Curtis (1939a) for series listing.

Fraser, J. C.
1947. Annual creel census, Truckee River, May 30, 1947. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 47-12, 9 p., 5 tbls. (Typewritten)
Continuation of program; weather and water conditions, catch composition, size, age, maturity; fishing intensity and success.

Soule, S. M.
1947. Poisoning of Shaver Lake, Fresno County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 47-9, 21 p., 1 fig., 3 tbls. (Typewritten)
Investigation with reference to condition necessary and feasibility; description of area and hydro-electric operation; public demand for improved fishery; possible control measures and conditions.

Vestal, E. H.
1947a. Creel returns from Crowley Lake, Mono County, California, 1946. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 47-3, 7 p., 1 fig., 2 tbls. (Typewritten)
First attempt to measure yield of lake impounded in 1940; description of lake, depth, temperature, tributaries; native and introduced species, history of planting; catch composition, fishing intensity and success.

Vestal, E. H.
1947b. Creel returns from Crowley Lake, Mono County, California, 1947. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 47-14, 6 p., 2 tbls. (Typewritten)
Second test of yield; review of descriptive data, summary of plantings; fishing intensity and success, catch composition; recommends limitation of season to May and June; catch limit of five; increased plant of catchable rainbow; discontinuance of Tahoe cutthroat plants.

Vestal, E. H.
1947c. A new transplant of the Piute trout (*Salmo clarkii seleniris*) from Silver King Creek, Alpine County, California. Calif. Fish and Game, vol. 33, no. 2 p. 89-95, 1 fig.
Report of survey of Upper Cottonwood Creek basin of White Mountains in Mono County to provide new and remote sanctuary; description of area, procurement and transplant of 401 fish; recommends removal of minor barriers, annual observations, additional plants; also recommends plantings in barren tributaries of native stream, periodic observations to determine and safeguard status.

Wales, J. H.
1947a. Castle Lake trout investigations: 1946 catch, and chemical removal of all fish. Calif. Fish and Game, vol. 33, no. 4, p. 267-286, 2 figs., 14 tbls.
Anglers' data and October 1946 conclusion of first phase of investigation by rotenone poison; record of plants 1938-1948, catch distribution by species; reasons, methods and results of poisoning, including description of new highly effective method; loss from predation, disease, old age.
See Wales (1944a, 1946, 1957) and Wales and German (1956).

Wales, J. H.
1947b. Creel census—May 1, 1947, McCloud River mouth, Shasta County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 47-10, 4 p., 1 tbl. (Typewritten)
Angling intensity and success; species caught, size and condition, rough fish; habitat conditions.

Dill, W. A. and S. M. Soule
1948. A fisheries survey of lakes in the Granite Creek drainage, Madera County, 1946. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-10, 35 p., 3 figs., 8 tbls. (Processed)
Evaluation of degree of natural propagation and amount of "carry-over" in populations due to past plantings prior to planting cessation; determination of location and inter-relationships of lakes; description of area and individual waters, results of previous stocking and management policies; fishing intensity and success; improvements required; recommends new stocking policy; evaluation of check dam sites.

Fraser, J. C.

1948a. The Frog Lake (Nevada County) fishery in 1947. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-8, 10 p., 5 tbls. (Typewritten)

Continuation of program, species caught; fishing intensity and success; recovery of marked specimens; notes complete dominance of browns. See Curtis (1939a) for series listing.

Fraser, J. C.

1948b. The poisoning of McMurray Lake, Nevada County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-1, 9 p., 1 tbl. (Typewritten)

Attempt to control catfish; description of area; methods and materials; effectiveness, size of browns recovered; recommends 7000 fingerling rainbow plant after dissipation of poison.

Soule, S. M.

1948a. An analysis of trout scales from Conn Valley Reservoir, Napa County, 1947. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-9, 13 p. (Typewritten)

Experiment to determine number of hatchery and wild specimens present in 107 samples; methods and materials; planting and marking history; survival.

Soule, S. M.

1948b. The San Joaquin River between Kerckhoff Reservoir and P. H. 3 (Fresno/Madera Counties). Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-19, 14 p., 13 figs. (Typewritten)

Description of affected area, fishery and management; stocking, proposed power developments and effects; concludes that Kerckhoff Reservoir would be unchanged if rough fish control instigated.

Vestal, E. H.

1948a. Additional treatment of aquatic plant beds at Twin Lakes, Mammoth, Mono County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-25, 6 p., 1 fig. (Typewritten)

Second sodium arsenite treatment; preparation, application and effect of chemical.

Vestal, E. H.

1948b. The creel census at Rush Creek Test Stream, Mono County, California, season of 1948. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-20, 14 p., 2 figs., 5 tbls. (Typewritten)

Description of area, methods and materials, operations, stocking; catch composition, marked specimens, survival; angling intensity and success; concludes that hatchery fish contributed 93.6% of total catch.

Vestal, E. H. and R. V. Beck

1948. Report on the stream-use census at Rock Creek, Inyo and Mono Counties, California, 1948. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-24, 23 p., 4 figs., 4 tbls. (Typewritten)

Project conducted to determine extent of public recreational uses; description of study area, diversions, culverts, stream sections; temperature and weather; methods and materials of census, stream-use intensity and distribution; planting history, catch composition, fishing intensity and success.

Wales, J. H.

1948. Creel census, May 1, 1948—McCloud River mouth, Shasta County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-11, 3 p., 1 tbl. (Typewritten)

Fourth report in series; fishing intensity and success; size of specimens caught; water and weather conditions.

Beck, R. V.

1949. Creel returns from Crowley Lake, Mono County, California, season of 1949. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-43, 10 p., 7 figs., 4 tbls. (Typewritten)

Continuation of program; description of lake, summary of plantings, catch analysis; notes steady decline in average catch; recommends season limited to May 1-July 15; bag limit of five fish or five pounds and one fish; increase planting of catchables.

Note: see critical *Comments* by other Bureau personnel, appended to report, 3 p.

Douglas, P. A.
1949. Rough fish control in Elizabeth Lake Canyon drainage, Los Angeles County, 1949. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-46, 23 p., 15 figs., 6 tbls., 1 graph. (Typewritten)
Attempt to rid lakes of undesirable population causing steady decline in fishing success; description of drainage and lakes, species present; physico chemical features, food and space competition, biological features; methods, materials and operation of chemical application; restocking program.

Fraser, J. C.
1949a. Annual Truckee River (Nevada County) creel census, May 1, 1948. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-6, 10 p., 5 tbls. (Typewritten)
Continuation of program; angling intensity and success; length, weight, maturity of specimens; catch record comparisons 1936-1947; concludes that rainbows provided 67.7% total creel returns, browns 32.3%.

Fraser, J. C.
1949b. The Frog Lake (Nevada County) fishery for 1948. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-8, 10 p., 5 tbls. (Typewritten)
Fishing intensity and success, catch analysis, marked specimens, stocking; notes complete dominance by browns; rainbow not satisfactory; lake for sale and future uncertainty of program.

Fraser, J. C.
1949c. Preliminary report on Wildlife Conservation Board Project No. 1, FT (O), El Dorado check dam program, El Dorado and Alpine Counties. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-14, 15 p. (Typewritten)
Brief presentation of biological evaluation of forty-seven sub-projects of program; flow requirements; recommends additional surveys prior to approval of construction projects.
See Fraser (1949e) for general recommendations and check dam discussion; also see Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-1 (1950-J. C. Fraser) for Supplementary Report No. 1.

Fraser, J. C.
1949d. Report on proposed power projects, Middle Fork Stanislaus River Tuolumne County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-37, 19 p., 7 figs., 4 tbls. (Typewritten)
Presentation of status of projects and substantiation of recommendations for fish life protection; description of projects, probable affects on fishery; spawning areas, pools and food production; fishing pressure and accessibility, flow records and requirements.

Fraser, J. C.
1949e. A report on the Emigrant Basin flow maintenance dam and stream improvement program. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-9, 74 p., figures in text. (Typewritten)
Presentation of existing knowledge and tentative evaluation of eighteen projects in U. S. Forest Service program; stocking, rehabilitation of water, tributary spawning streams, rearing ponds, self-sustaining populations; theory and concepts of check and retaining dams; water requirements for keeping stream sections in good condition for fish populations.
See Fraser (1949c); also see Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-1 (1950-J. C. Fraser) for Supplementary Report No. 1.

Fraser, J. C.
1949f. Upper Truckee River (El Dorado County) creel census, July 1, 1948. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-7, 3 p., 3 tbls. (Typewritten)
Catch record summary 1939-1948; length frequencies; evidence of heavy spawning; doubts continued fishery quality with increasing pressure.

German, E. R.
1949. Creel census at McCloud River mouth, Shasta County, May 1, 1949. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-17, 6 p., 3 tbls. (Typewritten)
Fifth annual census; angling intensity and success; size of specimens; notes appearance of Dolly Vardens in catch.

Kersnar, F. J.
1949. Chlorination of Crystal Lake. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-35, 21 p., 8 figs. (Typewritten)
Attempts to arrest development of protozoan parasite infection in water supply to State hatchery; description of number and species found; methods and materials; application requirements.

Kimsey, J. B.
1949. Annual creel census, Truckee River (Nevada County), May 30, 1949. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-42, 9 p., 6 tbls. (Typewritten)
Continuation of program; fishing intensity and success; catch composition; ratio of species.

Murphy, G. I.
1949. The 1947 and 1948 fishery of Conn Valley Reservoir, Napa County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-1, 23 p., 1 fig., 9 tbls. (Typewritten)
Brief sketch of physical and environmental factors pertinent to fishery; species present, stocking, tributaries; catch composition, angling intensity and success; length, weight, growth, survival, spawning; notes predation of green sunfish, large trout and aquatic birds; adverse chemical and physical conditions; lamprey injury; vast difference between 1947 and 1948 catch; concludes that 1947 catch consisted of 30% hatchery fish, 1948 of 96% hatchery fish; no self-maintenance of populations because of low summer adult survival.

Soule, S. M.
1949a. Creel census at Hume Lake, Fresno County, May 1, 1949. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-21, 24 p., 6 figs., 6 tbls. (Typewritten)
Description and history of lake and area; 1940 and 1947 poisoning and restocking; stocking history, angling pressure and success, number and species taken, condition of gonads.

Soule, S. M.
1949b. Power development of Kings River drainage, Fresno County, California: Report No. 2: North Fork of Kings River. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-39, 64 p., 19 figs., 3 tbls. (Typewritten)
Effect of projects upon fishery; description of area affected, water temperature, barriers, pools, spawning areas, species present, flow; natural propagation and stocking; accessibility; water requirements.

Soule, S. M. and W. A. Dill
1949. Pine Flat Reservoir, Fresno County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-28, 16 p., 2 tbls. (Typewritten)
Chronological development of multi-purpose project on Kings River; elevation, areas and capacities of reservoirs; annual pre- and post-project fishing value of area; description of river and fishery in area; affect of dam, dead storage or minimum pool provisions, screening, flow below dam, subimpoundments.

Wales, J. H. and E. R. German
1949. Sacramento River test stream report for 1948. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-30, 21 p., 5 figs., 6 tbls. (Typewritten)
Results of experiments at checking station below confluence of Middle and South Forks to determine fish planting effectiveness; description of water, carrying capacity, food grade.

Dill, W. A.
1950. A preliminary report on the status of the golden trout fishery in California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-44, 27 p., 8 figs. (Processed)

Results of 1949 survey request from Organized Sportsmen of California; natural range and extension, previous hatchery program, abundance, depletion dangers, fishing intensity, barriers to migration, restrictive regulations.

Note: adaptation appears in *Cent. Calif. Sportsman*, vol. 10, no. 3, p. 46-50.

German, E. R.
1950. Creel census at McCloud River mouth, Shasta County, April 29, 1950. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-31, 3 p., 1 tbl. (Typewritten)
Fishing intensity and success, species present.

Kimsey, J. B.
1950a. Chemical treatment of Miller Lake, Placer County, August 21, 1949. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-17, 8 p., 4 figs. (Typewritten)
Description of area, fishery, previous stocking; species caught by gill netting; methods and materials; restocking plans.

Kimsey, J. B.
1950b. Upper Truckee River creel census, July 1, 1949. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-4, 13p., 5 tbls.
Description of study area, fishing intensity and success, catch composition.

Kimsey, J. B.
1950c. Wildlife Conservation Board Project No. 49 FT (C): Tahoe National Forest flow maintenance and improvement program; report of survey in 1949. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-16, 46 p., figures, tables and maps in text. (Typewritten)
Description of area and individual waters; population and species present, catch data and composition; dam sites.

Murphy, G. I.
1950. Returns from marked fall spawning rainbow trout planted in several Mendocino County coastal streams in 1948. Calif. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-20, 6 p., 4 tbls. (Processed)
Details of plants in response to local sportsmen's demands; creel census, composition; notes failure of 50,000 plant.

Murphy, G. I. and H. E. Pintler
1950. The 1949 fishery of Conn Valley Reservoir, Napa County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-35, 9 p., 6 tbls. (Typewritten)
Fishing restrictions, limnological data, species present, planting history, catch records.

Soule, S. M.
1950a. Initial planting of golden trout in Hooper Creek Drainage. *Cent. Calif. Sportsman*, vol. 9, no. 7, p. 132-133, 136-137, 10 figs., 1 tbl.
Description of barren stream and area in Sierra National Forest; trapping, transporting, planting methods and materials; numbers of specimens and lakes stocked.

Soule, S. M.
1950b. Occasional creel censuses at Hume Lake, Fresno County, during 1949. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-23, 32 p., 1 tbl. (Processed)
Description and history of lake and fishery; stocking policies, fishing intensity and success; size, age and growth composition of catch; stocking recommendations.

Vestal, E. H.
1950a. Chemical treatment of Tamarack Lake, Mono County, California, 1949. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-6; 8 p., 2 figs. (Typewritten)
Program to rid lake of sequestered and dominant sand-bar sucker (*Catostomus arenarius*) population; description of area, methods and materials.

Vestal, E. H.
1950b. Chemical treatment of Upper Twin Lake, Robinson Creek, Mono County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-25, 30 p., 14 figs., 6 tbls. (Typewritten)
Program to curtail dominance of rough fish and increase sport fishery on decline since 1923 Bridgeport Dam construction; description and history of area, inlets and outlets, effect of beaver colony; physical and chemical features, species present; methods and materials of treatment; recovery, restocking and management of lake.

Vestal, E. H.
1950c. Creel inventory at Rush Creek Test Stream, Mono County, California, 1949. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-3, 14 p., 4 tbls. (Typewritten)
Catch records, planting programs, survival, catch composition.

Wales, J. H.
1950. Sacramento River experimental stream. 1949 report. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 50-29, 21 p., 1 fig., 11 tbls. (Typewritten)
Operation of checking station catch composition, planted fingerling survival, fishing intensity and success.

Bell, R. R.
1951. Creel check at Holy Jim Creek, Orange County—1951. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-33, 9 p., 3 tbls. (Typewritten)
Description of creek and drainage, flow, bottom composition, food abundance, check dams and pools, planting and marking records; angling methods, intensity and success; concludes low return to creel of planted fish; native population provide no fishery for heavy recreational use; plants of catchables before and during season only possible management program.

Calhoun, A. J.
1951. Lake Merced catch records for 1950. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-16, 18 p., 1 fig., 9 tbls. (Typewritten)
Rotenone treatment, restocking, poaching, catch records; length, weight, rate of growth; cost estimate.

Goodman, J. R.
1951. Toxicity of zinc for rainbow trout (*Salmo gairdnerii*). Calif. Fish and Game, vol. 37, no. 2, p. 191-194, 6 tbls.
Results of experiments to explain exhibit maintenance difficulties at Steinhart Aquarium; concludes that zinc at concentration of six parts per million fatal to fingerlings on exposures of forty-eight hours or less.

Meacham, C. H.
1951. Power development of Kings River drainage, Fresno County, California; report no. 4: headwater storage possibilities of the North Fork Kings River. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-30, 24 p., 3 figs., 9 tbls. (Typewritten)
Fourth report examining important water storage possibilities; review of affected area and status of proposed developments; description of stream areas, possible dam sites construction recommendations.

Miller, R. G.
1951. The natural history of Lake Tahoe fishes. Ph.D. dissertation, Stanford Univ., 160 p., 36 figs., 6 tbls. (Typewritten) Especially p. 16-29, p. 130-157.
Investigation with specific reference to food relationships; methods and materials; description of lake and basin, collecting stations, species present, food interrelationships, game and forage species, vegetation, feeding depths, stomach analyses, food percentages; habitat and association, introduction, spawning and development, length-weight correlation, natural reproduction, artificial stocking; history of fishery, catch records, non-aquatic predators, exotics, aggregations; concludes that mackinaw and rainbow predominate sports fishery; sculpin, creek chub and Tahoe sucker, surface and benthic invertebrates as important foods; mackinaw depend upon deep water benthos, rainbow upon pelagic midwater forms.
Note: appears as Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Repts. 49-15 and 49-16 (1949).

Newman, M. A.

1951. The social behavior of two species of juvenile salmonids. Univ. Calif., MA thesis, 73 p., 3 figs., 21 tbls. (Typewritten)

Results of experiment at Steinhart Aquarium; comparative description of social behavior, quantitative analysis of aggressive activity, effect of feeding on social behavior; methods and materials; activity types, pair contacts, color phases association with hierarchy, aggregation, territoriality, displacement reactions, factors for dominance; concludes that immature rainbow and brook trout undergo very definite social activities when confined with own species and that dominant-subordinant relations constitute most typical social order; indications of brook trout aggressive superiority.

Reimers, Norman

1951. Age and growth of trout in lakes of the Convict Creek basin, California. Univ. Calif., MA thesis, 63 p., 23 figs., 11 tbls. (Typewritten)

Part of U. S. Fish and Wildlife Service Trout Investigations; methods and materials of analysis of 804 specimens; topography and hydrography of study area, previous growth rate studies, past stocking, age composition of population, growth, length-weight relationship, coefficient of condition; concludes that age composition clearly artificial in lakes containing brown trout; natural spawning evidence without benefit of tributary streams.

Shapovalov, Leo

1951. A remarkable sea journey by a rainbow trout (*Salmo gairdnerii*) of interior stock." Calif. Fish and Game, vol. 37, no. 4, p. 489-490.

Notes Mendocino County recovery of specimen tagged on North Umpqua River in Oregon; 296 day trip of 100 miles of river and 300 miles of ocean, averaging minimum of 1⅓ miles per day; concludes no complete answer to question of difference between rainbow and steelhead, but notes that small rainbow of purest supposedly nonmigratory stock capable of and may make prolonged sea journeys, but probably lack homing instinct.

Soule, S. M.

1951. Power development of Kings River drainage, Fresno County, California; Report no. 3: junction development of the Kings River and its middle and south forks. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-17, 25 p., 3 figs., 1 tbl. (Typewritten)

Third in series; description of areas affected, species present, fishery, accessibility, stocking history; proposed developments and effects; concludes adverse affect of junction development.

Coots, M. H.

1952. Creel census– Shovel Creek, Siskiyou County, May 30, 1952. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-12, 6 p., 2 figs., 2 tbls. (Typewritten)

Opening day count to determine number of ripe or spawning specimens entering creel; angling intensity, success, accessibility; catch composition.

Douglas, P. A.

1952. A sixteen-day creel census on Deep Creek, San Bernardino County, April 28-May 13, 1951. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-21, 18 p., 8 figs., 7 tbls. (Typewritten)

Experiment to detemine return to angler, upstream-downstream movement of stocked specimens, role of wild specimens in catch; history and description of area, planting table, angling intensity and success.

Dunham, L. R.

1952. Report on the success of the golden trout transplant to Hooper Creek, Fresno County, California. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-27, 11 p., 6 figs. (Typewritten)

Historical review of plant; evidence of successful spawning, population condition, spawning gravels, angling intensity and accessibility; recommends continued reservation of Hooper Creek and lakes of basin for golden trout.

Fisher, C. K.
1952. Annual Truckee River, Sierra and Nevada Counties, creel census, May 26, 1951. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-3, 8 p., 3 tbls. (Typewritten)
Opening day count, weather and water conditions; angling intensity, success and quality; concludes that rainbow comprised 80.4% of catch, with remainder browns.

Fraser, J. C.
1952. The annual Truckee River, Nevada County, creel census, May 27, 1950. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-4, 7 p., 4 tbls. (Typewritten)
Angling intensity and success, species composition; concludes that rainbow comprised 75% of catch.

Freihofer, W. C.
1952. The limnology of a high Sierra Nevada mountain lake: Echo Lake, El Dorado County, California. Univ. Calif., MA thesis, 118 p., 23 figs., 19 tbls., 3 maps. (Typewritten)
Results of investigation to further knowledge of oligotrophic alpine lakes; public use of lake, species composition of fish population; geographic, hydrographic, geologic and meteorologic settings, physical and biological limnology, effect on fish.

Johnson, W. C.
1952. Lake Merced (San Francisco County) catch records for 1951. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-19, 6 p., 2 tbls. (Typewritten)
Catch composition; growth rate.

Kimsey, J. B.
1952a. The Grouse Ridge, Nevada County, creel census, July 5, 1949. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-15, 4 p., 1 fig., 4 tbls., appendix. (Typewritten)
Fishing intensity, accessibility, success; description of individual waters.

Kimsey, J. B.
1952b. A survey of Freshwater Lagoon, Humboldt County, April 1952. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-18, 4 p. (Typewritten)
Description and history of area, vegetation, bottom samples, outlet and inlet, spawning gravels, foraging and diving activities of aquatic birds.

Kimsey, J. B.
1952c. Upper Truckee River creel census, July 1, 1950. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-13, 8 p., 4 tbls. (Typewritten)
Description of stream section; evidence of bank erosion; angling intensity, success, quality; catch composition by species.

Maciolek, J. A. and P. R. Needham
1952. Ecological effects of winter conditions on trout and trout foods in Convict Creek, California, 1951. Amer. Fish. Soc., Trans., vol. 81, p. 202-217, 1 fig., 6 tbls.
Results of experiment designed to determine effect of low water temperature, snow, ice formation and dispersal; location and description of study area, methods and materials; principal species present, vegetation; sheet, shelf, frazil and anchor ice formation in stream; winter food supplies, bottom and drift foods, stomach analyses; mortality, activity; daily temperature cycle; concludes that fish active in freezing water and feed regularly throughout winter; large numbers of aquatic organisms dislodged by fluctuating flows; 50% over-winter survival of marked specimens.

Pister, E. P.
1952. The food and feeding habits of trout in the lakes of Convict Creek basin, California. Univ. Calif., MA thesis, 132 p., 42 figs., 65 tbls. (Typewritten)
Results of 979 stomach content analysis; geography, geology, climate and description of study area; methods and materials; foods present and consumed, feeding habits of different species, growth rates and condition.

Vestal, E. H.
1952. Report on further study of the Mammoth Pool project, San Joaquin River, Fresno and Madera Counties, California. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-29, 28 p., 15 figs. (Typewritten)
History of hydroelectric development extension; description of river section and fishery, effect of fluctuating water release from dams, accessibility; recommends 50 c.f.s. minimum release; fish screen installation.

Wales, J. H. and H. A. Hanson
1952. The effect of the fishery of the North Fork of the Feather River, California, of proposed hydro-electric developments with special reference to Cresta and Rock Creek projects. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-14, 48 p., 27 figs., 6 tbls. (Typewritten)
Description and history of area; physical, biological and chemical status; water releases, spawning time, angling values.

Bailey, E. D. and J. B. Kimsey
1953. Opening day creel census of north coastal lagoons. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 53-3, 15 p., 3 tbls. (Typewritten)
Description, stocking records, accessibility, angling intensity and success of individual waters.

Beck, R. V.
1953. Report on creel census at Rush Creek test stream, Mono County, California, 1951. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 53-18, 21 p., 5 figs., 3 tbls., Appendix. (Typewritten)
Description, location, access of test stream site; planting record, angling intensity and success, catch composition.

Bell, R. R.
1953. Coldwater Canyon Creek, Riverside County, creel census 1952. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 53-2, 6 p., 4 tbls. (Typewritten)
Description of typical coastal stream, planting of marked specimens; angling intensity, success and quality.

Flittner, G. A.
1953(?). The composition and distribution of the fish population in Sage Hen Creek, Nevada-Sierra Counties, California. Univ. Calif., MA thesis, 150 p., 66 figs., 25 tbls. (Processed)
Summarization of ten individual population samples obtained during intensive long-term study; methods and materials; review of literature, description of study area, geology, vegetational composition; species distribution and association, relationships between environment and species occurrence, population density, age and growth composition.

Gard, Richard
1953. A taxonomic study of the rainbow trout populations of the streams on Mt. St. Gorgonio, San Bernardino County, California. MA thesis, Univ. Calif., 59 p., 6 figs., 5 tbls. (Typewritten)
Results of investigation undertaken to determine if *Salmo evermanni* still in existence in pure or hybrid form and if extinct to ascertain characteristics and taxonomic status of population of area in question; contains correlation of some morphological features with several different types of environment; description of collecting areas, status of populations, sampling methods, statistical comparison of characteristics; effect of stocking on resident populations, hybridization, correlation between water temperature and meristic differences, stream velocity and linear characteristics; concludes that *S. evermanni* not present in study area; example of cutthroat elimination from native habitat resulting from rainbow introduction; Whitewater River population result of hatchery stocking; stocking of hatchery specimens greatly increases heterogeneity of population.

Kabel, C. S.
1953. Creel census, North Fork Feather River, Plumas County, May 30-31, 1953. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 53-20, 16 p., 1 fig., 7 tbls. (Processed)
Creel and use count; methods and materials; angling pressure, success, quality; planting records, catch composition.

Kimsey, J. B.
1953. Stomach analysis of thirty-one lake trout, *Salvelinus namaycush*, taken at Donner Lake, Nevada County, in 1949. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-8, 3 p., 1 tbl. (Typewritten)
Size and weight of specimens taken; diet composition; notes that other salmonids comprised only .6% of diet.

Pintler, H. E.
1953. The 1950 fishery of Conn Valley Reservoir, Napa County, California. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 53-1, 40 p., 6 figs., 11 tbls., appendix. (Typewritten)
History and description of reservoir, fish populations, stocking summary, angling pressure and success, catch records and composition, special problems of area.

Richard, J. B.
1953. Progress report No. 1, chemical treatment of Catfish and McMurray Lakes, Nevada County, 1952. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 53-5, 15 p. (Typewritten)
Attempt to control abundance brown bullhead (*Ameiurus nebulosus*) population and restore lakes to game fish production; methods and materials; subsequent rainbow plants, survival tests.

Vestal, E. H.
1953. The creel census at Rush Creek test stream, Mono County, California, 1950. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 53-19, 21 p., 2 figs., 7 tbls. (Typewritten)
Planting records, carryover, water releases; angling intensity, success quality.

California. Water Resources Board
1954. Interim report on the Klamath River basin investigation; water utilization and requirements. 117 p., 34 tbls., 18 pls., especially p. 85-89.
Importance of system as prime source of kings and steelhead rainbows; prevalence of resident species; spawning grounds; estimated 1952 retail and recreational value; spawning runs, peaks, extent; notes that habitat improvement would need to include better spawning areas, reduction in rapid water level fluctuations and increased stream flows and cooler water temperatures during late summer and early fall months.

Cronemiller, Fred and J. C. Fraser
1954. Stretching our Sierra trout streams. *Outdoor California*, vol. 15, no. 4, p. 3, 7, 1 fig., 1 tbl.
Five year history and summary of stream flow maintenance dam construction; location, water storage, stream miles benefitted and cost.
Note: continuation appears in *Outdoor California*, vol. 15, no. 5, p. 6.

Vestal, E. H.
1954. Creel returns from Rush Creek test stream, Mono County, California, 1947-1951. Calif. Fish and Game, vol. 40, no. 2, p. 89-104, 6 figs., 7 tbls.
Results of first give years of continuing complete census on 3.7 mile section; description of area, history of trout, management, planting, regulations, wild and planted populations, angling intensity and success; predators, nuisance effect of grazing animals; $10,500 cost of planting 70,000 catchables and $300,000 recreational value sustained; concludes that planted trout constituted 90% total catch; impractical to maintain angling in small heavily fished stream by stocking fry or subcatchables; recommends reduced bag limit to distribute catch more equitably.

Best, E. A. and J. H. Wales
1955. Rush Creek test stream—report for 1954. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-18, 15 p., 12 tbls. (Processed)
Planting history, marking of catchable yearlings; creel census results; angling intensity, success, quality; length frequency; evidence of natural spawning.

California. Division of Water Resources
1955. Requirements for fish, wildlife and recreation. *In* Northeastern counties investigations: report on Upper Feather River service area, p. 170.

Utilization of resources in area, species present; flow, quality and temperature requirements.

See Dwyer (1955).

Dwyer, E. V.

1955. Ultimate water requirements in the Feather River drainage basin for fish and game. *In* Northeastern counties investigations: report on Upper Feather River service area. Calif. Div. Water Resources, Appendix D, 42 p., 7 tbls., 1 pl.

Development of recreational hunting and fishing, description of stream sections, effects of major developments, improvement projects, angling and hunting pressure and value.

Fisk, L. O. and D. E. Pelgen

1955. A limnological survey of Lake Pillsbury, Lake County, California. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-23, 17 p., 2 figs., 9 tbls. (Processed)

Study to determine types of fisheries to be established in reservoir proposed by California Water Plan threatening anadromous runs; description and history of reservoir; temperature, dissolved oxygen, turbidity, thermocline depths, plankton, bottom samples; concludes that temperature conditions approach upper limits tolerated by trout.

Hume, L. C.

1955. Rainbow trout spawn twice a year. Calif. Fish and Game, vol. 41, no. 1, p. 117.

Report of 1951-1952 observations at Darrah Springs Hatchery, Shasta County; Idaho origin of specimens, dates of spawn, relationship of water temperature.

Kimsey, J. B.

1955. 1952 opening day creel census of seven waters planted from East Side Reservoir, Napa County. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-5, 17 p., 12 tbls. (Typewritten)

Angling intensity, success, quality; possibility of furunculosis; suggestions for increasing cropping.

Macklin, Robert

1955a. California trout production costs 1953-1954. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-11, 6 p., 3 tbls. (Processed)

Cost analysis of planting 17,773,022 specimens; food, labor, miscellaneous cost items; number and pounds trout produced and planted; concludes $0.16 average cost per catchable planted, $0.01 per fingerling.

See Macklin (1955a), Macklin and Cordone (1956a) and Macklin and (1957).

Macklin, Robert

1955b. Second progress report on trout feeding studies. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-10, 10 p., 6 tbls. (Processed)

Experiment at Moccasin Creek Hatchery to develop dry food to maintain health and rapid growth; methods and materials; types of food, growth rates, condition of fish; concludes that Dawes Vitamelk unsuccessful in replacing brewers dried yeast type 50-B as vitamin supplement; California pellet formula basically sound.

Macklin, Robert and A. J. Cordone

1955. California trout production costs, 1954-55. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-22, 7 p., 4 tbls. (Processed)

Cost analysis of planting 17,894,038 specimens; food, labor, miscellaneous cost items, number and poundage produced and planted; concludes $0.123 average cost per catchable size planted, $0.011 average per fingerling.

See Macklin (1955a), Macklin and Cordone (1956a) and Macklin and Tharratt (1957).

Reimers, Norman, J. A. Maciolek and E. P. Pister

1955. Limnological study of the lakes in Convict Creek Basin, Mono County, California. U. S. Fish and Wildlife Ser., Fish. Bull. 103, vol. 56, p. 437-503, 25 figs., 37 tbls., 10 maps.

General description of study area, geography, vegitation, climate, physical characteristics of lakes, hydrochemistry and mineral sources; food and feeding habits of trout, bottom fauna, zooplankton, terrestrial insects, productivity, food habits; age, growth, conditions of populations; concludes that bottom fauna production ranged from 19 to 211 pounds per acre, limited variety; largest percentage in volume comprised of aquatic organisms other than plankton, immature chironomids taken in greatest amount; terrestrial insects secondarily important; evidence suggests more pronounced shoal-feeding habit in small trout; successful natural spawning without benefit of tributaries; no important causes of productivity differences definitely indicated.

Rowley, W. E., Jr.

1955a. Hydrostatic pressure tests on rainbow trout. Calif. Fish and Game, vol. 41, no. 3, p. 243-244, 1 fig.

Description of tests designed to determine species ability to withstand conditions occurring in penstock and turbine chambers of hydroelectric systems; concludes that eight inch specimens able to withstand 50-200 pounds per square inch pressure.

Rowley, W. E., Jr.

1955b. 1954 creel census, North Fork Feather River. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-9, 18 p., 2 figs., 17 tbls. (Processed)

Report of cooperative study between Department and Pacific Gas and Electric to provide factual basis for setting water releases from power diversion; description, location of study areas; methods and materials; angling pressure, success, quality, catch composition.

Unruh, B. H. and P. E. Giguere

1955. Living room for trout. *Outdoor California*, vol. 16, no. 12, p. 4-5, 5 figs.

Details of Southern California deflector dam construction; methods and materials.

Vestal, E. H.

1955. Hell-for-sure trout; an angler's guide to the waters of the Fleming Creek to Bench Valley Area, North Fork, Kings River, Fresno County, California. *Cent. Calif. Sportsman*, February, 17 figs.

Report of annual cooperative lake and stream survey to provide up-to-date information on all back country waters; description and location of individual waters, accessibility, angling regulations, stocking possibilities.

Wales, J. H.

1955. Is there a place for the brown trout? *Outdoor California*, vol. 16, no. 4, p. 8-10, 2 figs.

History of Rush Creek test stream experiment; marking, planting, recovery; cost of rearing catchables, partial self-sustaining character, habitat and spawning.

Wales, J. H. and Harold Wolf

1955. Three protozoan diseases of trout in California. Calif. Fish and Game, vol. 41, no. 2, p. 183-187.

Record of diseases important in state hatcheries; occurrence, epidemiology, pathology.

Cordone, A. J. and Robert Macklin

1956. Fourth progress report on trout feeding experiments. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-17, 8 p., 4 tbls. (Processed)

Methods and materials; growth rate, mortality, water temperature; concludes that fry fed standard hatchery diet grew faster and suffered less mortality in comparison with fry fed Clark's dry food; no significant difference between two diets in fingerlings.

Giguere, P. E. and C. E. Von Geldern, Jr.

1956. Rush Creek test stream—progress report for 1955. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-14, 10 p., 6 tbls., Appendix 1-7. (Processed)

Planting and recovery of marked specimens; census work; angler intensity, success, quality; notes progressively improved quality; spawning evidence.

Hinze, J. A., A. N. Culver and G. V. Rice
1956. Annual report. Nimbus salmon and steelhead hatchery, fiscal year of 1955-56. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-25, 50 p., 11 figs., 13 tbls. (Processed)
First in series reporting operation of unit designed to maintain anadromous populations formerly spawning in American River above Nimbus and Folsom Dams; history and operation of installation, water conditions affecting operations; number and composition of 1955 runs; production of egg, alevin and fingerlings; planting carcass processing, experimental work, disease history, fertility checks, holding and rearing ponds, mortality; notes possible relationship between occurrence of gas embolism affecting alevin and turbidity of storm water.

Johnson, W. C.
1956. Lake Merced boat catch records 1955 and their reflection on the lake's fisheries management program. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-23, 11 p., 2 figs., 5 tbls. (Processed)
Boat catch analysis, effects of planting program, cost aspect of fishery maintenance; catch record system, angling intensity, success, quality.

Macklin, Robert and A. J. Cordone
1956a. California trout production costs, 1956. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-22, 13 p., 7 tbls. (Processed)
Third report in series; cost analysis of major items, operation of hatcheries; concludes $0.136 cost per each catchable, $0.011 per each fingerling.
See Macklin (1955a), Macklin and Cordone (1955) and Macklin and Tharratt (1957).

Macklin, Robert and A. J. Cordone
1956b. Fifth progress report on trout feeding experiments. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-19, 8 p., 3 tbls. (Processed)
Methods and materials; growth rate, mortality, water temperature; concludes that combination including J. R. Clark's New Age Trout Food unsatisfactory for production diet.

Macklin, Robert and A. J. Cordone
1956c. Third progress report on trout feeding experiments. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-12, 9 p., 4 tbls. (Processed)
Experiment designed to test two commercial foods; growth rate, health, conversion and cost per pound; fingerling and catchable phases; concludes that fish on liver and ocean fish diet outgrew dry food diet fish; tendency of J. R. Clark dry food to produce blue shine or backpeel disease symptom.

Outdoor California
1956. Cutthroat nursery. Vol. 17, no. 6, p. 6-7, 11, 4 figs.
Description of Heenan Lake, Alpine County, managed on basis of sustained egg yield for California and Nevada waters; original stocking in reservoir, construction and operation of egg-taking station, original distribution and habitat of species, growth, possibilities of transplanting.

Pintler, H. E.
1956. A management plan for Llagas Creek, Santa Clara County, California, in relation to the Llagas Creek Dam and Cheseboro Reservoir. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-16, 6 p., 1 fig. (Typewritten)
Possibilities of fishery initiation; description of drainage and area; streamflow; recommends 50,000 plant of resident rainbow; sampling to determine spawning success; if unsuccessful, planting of largemouth bass.

Reimers, Norman
1956. Some aspects of the relation between stream foods and trout survival. Calif. Fish and Game, vol. 43, no. 1, p. 43-69, 10 tbls.
Results of Convict Creek Station studies to obtain more information on winter foods and feeding, speed and effectiveness of digestion at various temperatures, effects of prolonged starvation; description of area; bottom and drift foods, feeding, digestion and starvation experiments, survival in relation to food and exposure; concludes that low winter

food supply not crucial factor in survival; healthy specimens capable of long fasting periods, particularly in cold water; competition with resident stock not critical factor in survival of planted stock.

Wales, J. H. and E. R. German

1956. Castle Lake investigation—second phase: eastern brook trout. Calif. Fish and Game, vol. 42, no. 2, p. 93-108, 2 figs., 14 tbls.

Report covering period from 1947 rotenone treatment to 1954; description of area, program and methods; growth rates, longevity, production, comparative cost of planting methods; angling quality, recommended management practices; notes desirable 1946 removal of highly predacious brown and lake species; increasing fingerling brook survival.

Note: adaptation appears in *Outdoor California*, vol. 17, no. 6, p. 14-16 (1956).

See Wales (1944a, 1946, 1947a, 1957).

Evans, W. A.

1957. The 1956 fisheries studies at Lake Pillsbury, Lake County. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-30, 12 p., 1 fig., 7 tbls. (Processed)

Report of creel census to determine role of planted catchable and wild trout in sustaining fishery; methods and materials of planting, tagging, and recovery; physical and biological features of study area; tagging program results, census data; fishing pressure, quality, success; concludes that wild trout contributed 65% of 1956 catch; low return of marked catchables planted.

Fisher, C. K.

1957. The Lake Merced, San Francisco County, trout planting program. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-25, 20 p., 3 figs., 3 tbls., Appendix 1-2. (Typewritten)

Attempt to formulate planting program in effort to improve fishing; location and description of lake, stocking program history; catch composition, intensity, success, quality; management recommendations.

Johnson, W. C.

1957. Lake Merced boat catch records in 1956 and their reflection on the lake's fisheries management program. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-17, 9 p., 2 figs., 3 tbls. (Processed)

Description of lake and fishery; catch record system and planting program, catch composition.

Macklin, Robert and A. J. Cordone

1957. Sixth progress report on trout feeding experiments. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-21, 32 p., 25 tbls. (Processed)

Experiment to determine technical improvements, when to feed dry food, health maintenance; methods and materials at various hatcheries; growth rate, health, mortality, food cost; concludes less cost to produce one pound of trout on dry food than on regular hatchery meat diet; dry food compared favorably with meat diet in all experiments.

Macklin, Robert and Robert Tharratt

1957. California trout production costs. Calif. Dept. Fish and Game, Inland Fish. Br., Adm Rept. 57-22, 24 p., 8 tbls., Appendix 1-4. (Processed)

Fourth in series; hatchery operation and costs; concludes $1,530,278 total cost of trout and salmon produced present year; $0.007 per fingerling, $0.143 per catchable.

See Macklin (1955a), Macklin and Cordone (1955, 1956a).

Nielson, R. S., Norman Reimers and H. D. Kennedy

1957. A six-year study of the survival and vitality of hatchery-reared trout of catchable size in Convict Creek, California. Calif. Fish and Game, vol. 43, no. 1, p. 5-42, 4 figs., 22 tbls.

Description of experimental stream, construction of apparatus, general methods; natural density of wild brown population, comparative survival of hatchery-reared rainbow and resident brown species, length, weight, coefficients of conditions, survival and loss, weather conditions; concludes that hatchery-reared rainbow exhibit equal survival ability to wild brown; capable of competing with residents; stocking density little effect on survival, suggesting scant nature of knowledge of stream carrying

capacity and factors influencing; mortality high in both resident and introduced stocks; recommends stocking of catchable size immediately prior to and during open season in areas of high angling pressure.

Wales, J. H.

1957. Castle Lake investigation—progress report for 1956. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-6, 23 p., 17 tbls. (Processed)

Presentation of data and correlation with previous work; methods and materials; periphyton tests, angler catch, effort, success, quality; survival of planted fish, growth rates.

See Wales (1944a, 1946, 1947a) and Wales and German (1956).

Jensen, P. T.

1958. Catchable trout studies in Region II, 1957. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 58-1, 39 p., 11 figs., 11 tbls., Appendix I-VI. (Processed)

Description of five waters studied (East and West Carson Rivers and Pleasant Valley Creek, Alpine County; Little Truckee River, Sierra County; and Butte Creek, Plumas County); census methods and materials; angling intensity, success, quality; planting history, return to creel of marked specimens; concludes that returns exceed 50% in each water; more even distribution of catch among anglers; relatively constant catch per hour of 0.5.

Wales, J. H.

1958. Two new blood fluke parasites of trout. Calif. Fish and Game, vol. 44, no. 2, p. 125-136, 6 figs.

Report of investigation following 1955 severe epizootic at Darrah Springs Hatchery, Tehama County; loss of 300,000 fish, causes; description of flukes, distribution, life cycle, pathology, taxonomy, control methods.

BLACK BASS

Micropterus salmoides
Micropterus dolomieu

Ferguson, A. D.
1913. Trout and black bass planting and transplanting in the San Joaquin and south Sierra districts. Calif. Fish and Game Comm., Fish Bull. 1, p. 42
Natural conditions in area, history of planting expeditions, description of lakes planted.

Neale, George
1916. Black bass eat mosquitos. Calif. Fish and Game, vol. 2, no. 2, p. 50
Records noticeable decrease in mosquito population subsequent to black bass introduction.

Neale, George
1931. Large mouth black bass. *In* The spiny-rayed game fishes of the California inland waters. Calif. Fish and Game, vol. 17, no. 1, p. 9-10, Plate 2.
Specific characteristics, nativity and distribution, seasons and methods, nesting.

Needham, P. R. and L. A. Brown
1933. Notes on the use of water fleas as fish food. Amer. Fish. Soc., Trans., vol. 63, p. 131-138, 1 fig.
Presentation of data regarding behavior of daphnids in laboratory experiments; growth rate, longevity of cultures, culture fertilizer, feeding methods.

Snyder, J. O.
1934. Report on black bass propagation work. Calif. Fish and Game, vol. 20, no. 1, p. 72-73.
Brief summary of one-year experimental work and difficulties involved; food ponds, food requirement, cannibalism, depredation.

California Conservationist
1936. Small mouth bass propagation method described. Vol. 1, no. 3, p. 12-13.
Report of experiment initiated in 1933; problems of seminatural propagation, hatchery and pond requirements, nesting and breeding habits, role of male, behavior and growth of young, food requirements, fertilization of pond waters, planting restrictions.

Brown, M. W.
1939a. A brief history and identification of the three species of black bass now occurring in California. Calif. Fish and Game, vol. 25, no. 4, p. 310-312, 4 figs.
Introduction, propagation, habitat, range, distinguishing characteristics of large-mouth, small-mouth and spotted species.
Note: also appears in *Calif. Conservationist*, vol. 5, no. 1, p. 17, 24 (1940).

Brown, M. W.
1939b. Smallmouth black bass propagation in California. Amer. Fish. Soc., Trans., vol. 60, p. 119-124, 1 fig., 1 tbl.
History of species, introduction, success, operation of Central Valleys Bass Hatchery; effect of high temperatures, filamentous algae, predaceous birds and insets, bull-frog tadpoles.

Dill, W. A.
1939. Report on a collection of fish from Bear Lake, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 39-4, 5 p., 4 tbls. (Typewritten)
Age and growth, sexual maturity, length-weight, stomach contents of sixteen specimens; concludes that collection too small to warrant definite conclusions but indicates small growth rate.

Dill, W. A.
1940. A preliminary report on Bass Lake, Madera County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-12, 38 p., 13 figs. (Typewritten)
Study resulting from demand for stocking and improvement following poor fishing; review of problem and recommendations for management; general description, fishery, species present, angling methods, physical and chemical conditions, temperature, oxygen, food productivity, natural

propagation, predators and disease, mixed populations; diversions and spill of water, shelter, boating; concludes that only small percentage of available supply caught; natural propagation and survival good; water fluctuations, rising temperature, lack of cover, motor boating main causes spoiling fishery; recommends planting suitable real and artificial cover.

Shapovalov, Leo

1940a. Report on a survey of a proposed planting base in Glenn County and certain waters in Glenn and Colusa Counties. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-14, 9 p. (Typewritten)

Study at request of Willows Sportsmen's Club to determine any improvements in distribution; description of area, proposed pond site, water temperature, spawning possibilities; recommendations for stocking.

Shapovalov, Leo

1940b. Report on possibilities of establishment and maintenance of salmon and steelhead runs in Cache and Putah Creeks. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-16, 47 p., 14 figs. (Typewritten)

General description of watershed, topography, water flow and temperature, flood control and water use, dams and barriers, changes in creek character; effect of Central Valley Project construction; notes small-mouth bass spawning, stocking, rescue, fishing intensity; effects of deforestation, overgrazing, silting, road work; concludes that streams unsuitable for anadromous species; recommends management of Putah Creek as small-mouth bass fishery.

Shapovalov, Leo

1940c. Report on possibilities of utilization of Hinkley Creek, Santa Cruz County, for fish cultural and fish management purposes. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-18, 26 p., 2 figs., 1 tbl., Appendix A-B. (Typewritten)

Description of area and drainage basin, tributaries, flows, temperature, fishing possibilities.

Sumner, F. H. and O. R. Smith

1940. Hydraulic mining and debris dams in relation to fish life in the American and Yuba Rivers of California. Calif. Fish and Game, vol. 26, no. 1, p. 2-22, 10 figs.

Summary of 1938 biological survey report submitted to Corps of Engineers; physical features of rivers, history of mining and dams, distribution and records of fish, effect of debris dams and mining debris on fish and fish foods, natural erosion; concludes that renewed hydraulic mining only slightly detrimental to sport fishing.

Woodhull, C. A.

1941. A report on the Kern River small-mouthed bass. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 41-17, 11 p., 1 fig. (Typewritten)

Description and potentialities of area; water temperature and velocity, rescue work, fish foods; plantings; crayfish experiment.

Note: "Supplementary report No. 1" appears as Adm. Rept. 41-18 (1941) and contains planting recommendations.

Dill, W. A. and Chester Woodhull

1942. Upper Salinas Reservoir, San Luis Obispo County, Report No. 1. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 42-20, 27 p., 5 figs., 6 tbls. (Typewritten)

Preliminary report of brief survey to determine fish stocking suitability; location, description, use, ownership of dam and reservoir; fluctuations, bottom composition, aquatic plants, physical and chemical conditions, potential spawning areas; concludes that dam forms complete trout run barrier; good food production; spawning grounds available; reservoir possesses some "trout lake" qualities but more as "bass lake"; recommends obtaining more water temperature and dissolved oxygen content data; possible trial rainbow-steelhead stocking and if unsuccessful then large-mouthed bass and sunfish.

Wales, J. H.

1943. Report on investigations on Clear Lake, Lake County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 43-4, 24 p., 2 figs., tbls. in text. (Typewritten)

Description of program undertaken to determine whether commercial fishing permit should be extended; seining methods; species concerned, abundance, distribution, stomach content analysis, length, weight, growth rate, predation; catch records, water level, fish loss through Cache Creek outlet gate.

Dill, W. A.

1944a. The Colorado River survey—1942; Book I: dams, diversions, pumps. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-9, 74 p., 37 figs. (Typewritten)

Detailed description of all man-made projects (except Hoover Dam) that affected or would affect lower river fishery; designed to supplement Dill (1944b); only report offering complete picture of dams, diversions and interrelationships; concludes that, in general, river developments augur well for fishery.

Dill, W. A.

1944b. The fishery of the Lower Colorado River. Calif. Fish and Game, vol. 30, no. 3, p. 109-211, 38 figs., 7 tbls.

General description of river basin, physical and chemical conditions influencing fishery, biological factors, effect of dams and diversions, fishing intensity and methods; specie characteristics, distribution, abundance, habitat, size, growth, condition, reproduction, food, predation, importance to fishery: p. 174-177.

See Dill (1944a) for supplement.

Dill, W. A.

1945. The fishery of Millerton Lake, Fresno/Madera Counties; progress report no. 1: the creel counts of May 29 and 30, 1945. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 45-15, 26 p., 3 figs., 2 tbls. (Typewritten)

Description of area, potentialities, stocking history; size of specimens caught, fishing conditions, methods and intensity.

Dill, W. A.

1946. A preliminary report on the fishery of Lake Millerton, California. Calif. Fish and Game, vol. 32, no. 2, p. 49-70, 8 figs., 2 tbls.

Physical features and uses of Friant Dam, description of reservoir, fish stocking and early management; 1945 catch records, weekly fluctuations, seasonal variation, fishing intensity and yield, size and condition of population, spawning; fishing regulations, interference by speed boats; mentions trout, king salmon, carp as unimportant but existing species.

Note: appears as Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 43-3 (1943).

See Abell and Fisher (1953) and Fisher (1953).

Dill, W. A., S. M. Soule and C. K. Fisher

1946. A preliminary report on the May 29, 1946, creel count at Millerton Lake, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-10, 4 p. (Typewritten)

Opening day fishing pressure and success.

Murphy, G. I.

1946. Clear Lake, Lake County, investigation: progress report No. 1. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-17, 6 p.

Physical and ecological attributes of lake, fishing effort and success, species present, measurements, scale samples, catch records, limnological data; management recommendations.

Woodhull, Chester

1946. The drainage system of Bass Lake, El Dorado County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-4, 21 p., 14 figs. (Typewritten)

Findings of surveys and inspection trips; history, description and use of lake, introduction of species, water supply, outlet, flows.

Curtis, Brian

1949. Largemouth black bass. *In* The warm-water game fishes of California. Calif. Fish and Game, vol. 35, no. 4, p. 260-263, color plate no. 1.

General review of known facts and previous studies; geographic range, identifying characteristics; spawning habitat and pattern, development of eggs, growth of young, feeding habits.

Murphy, G. I.

1949. The food of young largemouth black bass (*Micropterus salmoides*) in Clear Lake, California. Calif. Fish and Game, vol. 35, no. 3, p. 159-163, 1 fig., 2 tbls.

Results of study to determine mid-summer feeding habits; 264 stomach content analyses, general ecology of study area; concludes that plankton and small insects chief foods of bass below 1.8 inches, insects of those between 1.8 and 2.8 inches, and fish of those over 2.8 inches; bluegill fry not important item of diet; greaser blackfish most important forage fish, corixids most important insect; no evidence of interyear class predation.

Note: appears as Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-23 (1948).

See McCammon (1957).

Soule, S. M. and W. A. Dill

1949. Pine Flat Reservoir, Fresno County. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 49-28, 16 p., 2 tbls. (Typewritten)

Chronological development of multi-purpose project on Kings River; elevation, areas, and capacities of reservoir; annual pre- and post-project fishing value of area; description of river and fishery in area; effect of dam, dead storage or minimum pool requirements, screening, flow below dam, subimpoundments.

Douglas, P. A.

1951. Farm pond investigation, southern District No. 8, Report no. 2. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-32, 11 p., 1 fig., 2 tbls. (Typewritten)

Notes 1944 initiation of stocking program in Antelope Valley area and rechecking results; fluctuations, limited food production and spawning, fishing intensity; physical, chemical and biological characteristics; methods and materials; concludes that small fluctuating irrigation ponds not well suited for largemouth bass; generally poor spawning conditions; daily pumped cold water flushes out plankton foods, inhibits spawning and provides thermal shock; comparative recreational values not realized for effort involved in stocking; recommends experiments with other species; "use-education" program necessary; heavier utilization of fishery.

Fisher, C. K.

1951. Progress report No. 2 on the fishery of Millerton Lake, California. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-31, 58 p., 16 figs., 12 tbls. (Processed)

Description of reservoir impounded by Friant Dam; physical and chemical characteristics, species present, catch records, creel census, catch composition; rotenenone treatments, population composition, gill netting, tagging, age and growth, spawning season, forage fish preference; concludes that decreases in fishing quality and game fish populations formerly believed due to adverse spawning conditions actually due to lowering of lake's carrying capacity; loss of nutrient materials due to top soil and silt washing into lake through water fluctuations and wave action by San Joaquin River; recommends introduction of new game or forage species.

Bell, R. R.

1952. The fishery of Vail Reservoir, Riverside County; a preliminary report. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-24, 12 p., 4 tbls. (Typewritten)

Study of closely restricted management of controlled warm-water fishery; history and description of reservoir; chemical, botanical and zoological data; species present, stocking records, catch composition and records; management and regulation recommendations.

Fisher, C. K. and D. L. Abell

1952. Creel census at Millerton Lake, 1946-1951. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-26, 51 p., 15 figs., 17 tbls., appendices. (Typewritten)

History and description of reservoir, fishery and investigation; methods and materials; angling intensity, success, quality; census method evaluation; annual trends in effort, catch and fishing quality; management and regulation recommendations.

Wohlschlag, D. E. and C. A. Woodhull
1952. The determination of fish populations in a medium-sized warm-water reservoir. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-6, 78 p., 18 figs., 22 tbls. (Typewritten)
Mark-and-recapture method in Salt Spring Valley Reservoir, Calaveras County; description and history of reservoir, methods and materials; length frequency, growth rate, weight; concludes that bass population quite small, but efficiently exploited; little available forage for small bass from autumn to spring; series of management problems.

Abell, D. L. and C. K. Fisher
1953. Creel census at Millerton Lake, California, 1945-1952. Calif. Fish and Game, vol. 39, no. 4, p. 463-484, 13 figs., 7 tbls.
Results of intensive study of warm-water representative sample to discover why large fluctuating reservoirs in Sierra Nevada foothills produce so few game fish and to find means of improving fishing qualities; brief description of area; census methods and operations, fishing effort, catch composition, estimates of total catch, fishing quality, monthly average weight, forage fish, regulations; notes bass angling effort frequently not well correlated with quality; concludes that fluctuations apparently related to normal decline of fertility in new lake basins; marked decline in weights during summer; existing regulations adequate.
See Dill (1946) and Fisher (1953).

Bell, R. R. and J. B. Kimsey
1953. Some considerations on the chemical treatment of the Monticello Reservoir basin, Napa County. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-6, 7 p. (Typewritten)
Report answering questions of practicability of eliminating rough fish from Putah Creek drainage prior to completion of dam forming Monticello Reservoir; status of species present, feasibility of eradication, unsuccessful attempts to eliminate carp in other regions of State; recommends introduction of large number of largemouth bass during reservoir formation; no chemical treatment of Putah Creek.
See Johnson (1957) for report on subsequent treatment.

Fisher, C. K.
1953. The 1950 largemouth black bass and bluegill tagging program in Millerton Lake, California. Calif. Fish and Game, vol. 39, no. 4, p. 485-487, 1 fig.
Summary of results of one phase of program to discover means of improving angling; 61 tagged, 12 recovered, movement of 1.2 miles; concludes that even though species move relatively little, angler concentration insufficient to cause depletion.
See Dill (1946) and Abell and Fisher (1953).

McCammon, G. W.
1953. Lake Wohlford, San Diego County, catch record analysis, 1950-1952. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 53-6, 10 p., 3 tbls. (Typewritten)
Angling intensity, success, quality; catch composition; notes abrupt 1952 decrease in fishing success.

Wohlschlag, D. E. and C. A. Woodhull
1953. The fish populations of Salt Springs Valley Reservoir, Calaveras County, California. Calif. Fish and Game, vol. 39, no. 1, p. 6-44, 13 figs., 15 tbls.; especially p. 11-15 and 39-40.
Description and history of area, introduction of species, October 1947 rotenone treatment, restocking; marking and recovery data, recruitment, effects of natural and fishing mortality, management problems; weight, length-weight relationship, population estimate of 15,000 over four inches; recommends removal of carp as forage and replacement by small minnows.

Bell, R. R. and J. B. Kimsey
1954. A population study of Turlock Reservoir, Stanislaus County. Calif. Dept. Fish and Game, Inland Fish Br., Adm. Rept. 54-10, 8 p., 3 tbls. (Processed)

Population numbers and species interrelationships; marking and capturing; concludes low basic fertility of lake; lack of forage organisms in significant numbers; successful bass spawning; recommends introduction of fathead minnow.

Kimsey, J. B.

1955. Results of population sampling at Millerton Lake, Fresno/Madera Counties, July 1955. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-20. 12 p., 4 figs., 1 tbl. (Processed)

Short-term study to determine black crappie and forage fish status; description of lake, species present, length, weight, stomach analysis; concludes that forage for bass hardly adequate; bluegill concentration in 2- to 4-inch class too large for forage; suggests possibility of using striped bass to reduce unsatisfactory bluegill class.

Kimsey, J. B. and R. R. Bell

1955. Observations on the ecology of the largemouth black bass and the tui chub in Big Sage Reservoir, Modoc County. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 55-15, 17 p., 5 figs., 5 tbls. (Processed)

Brief study to clarify relationship of game and forage fishes; description of reservoir, history of planting, native species, fishery; bass growth rate, mean monthly air temperatures, food habits, length-weight relationship; concludes no serious conflicts in forage requirements; overcrowded bass population might be improved by addition of pumpkinseed sunfish, *Lepomis gibbosus*.

Kimsey, J. B.

1956. Largemouth black bass tagging. Calif. Fish and Game, vol. 42, no. 4, p. 337-346, 4 figs.

Devoted to development, use, suitability of tags in aquaria and field.

Kimsey, J. B. and R. R. Bell

1956. Notes on the status of the pumpkinseed sunfish, *Lepomis gibbosus*, in the lower Susan River, Lassen County, Cailfornia. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-1, 20 p., 5 figs., 6 tbls. (Processed)

Brief study to determine capability of species to provide bass forage in cooler coastal ponds and lakes; physical characteristics of river, introduced and native species present, fishery, catch data; growth rate, weight, length; concludes that pumpkinseed thrive in colder waters than bluegill; no food competition between adult of species; pumpkinseed dominates panfish population and provides fishery.

Johnson, W. C.

1957. Chemical treatment of Putah Creek (Lake, Napa, Solano and Yolo Counties). Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-9, 16 p., 1 fig., 2 tbls., Appendix I-III. (Processed)

Removal of carp infested in planned Berryessa Reservoir basin prior to impoundment of water; description of creek and drainage; species present; method and materials of treatment program costing $16,578; salvage of game fishes; recommends planting white catfish and largemouth bass.

See Bell and Kimsey (1955) for recommendations against treatment.

Kimsey, J. B.

1957. Largemouth bass tagging at Clear Lake, Lake County, California. Calif. Fish and Game, vol. 43, no. 2, p. 111-118, 1 fig., 3 tbls.

Partial results of program initiated June 1953 to obtain angling and natural mortality statistics; methods of capture; tag recovery and suitability; length frequency, movement, harvest, angling pressure; concludes undirected migration; 44% survival; no overfishing problem.

McCammon, G. W.

1957. Further observations on the food of fingerling largemouth bass (*Micropterus salmoides*) in Clear Lake, Lake County. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 57-7, 14 p., 3 figs., 3 tbls. (Processed)

Continues study of forage fish problems; methods and materials; stomach content analysis; frequency of occurrence, volume and number of food items, size of specimens; food habit transition; concludes that

plankton most important food for bass under 1.5 inches, insects for 1.7 inch to 2.5 inch bass, fish for 2.5 inch and over; bluegill sunfish most important forage specie; amphipods and diptera major invertebrate food; no blackfish found; no interyear class predation; previous and present study do not provide adequate data for management program; blackfish value as forage specie questionable.

See Murphy (1949).

CARP

Cyprinus carpio (Linné)

Neale, George
1931. Carp. *In* The spiny-rayed game fishes of the California inland waters. Calif. Fish and Game, vol. 17, no. 1, p. 13.
Notes introduction.

Croker, R. S.
1934. The freshwater commercial fisheries of California. Calif. Fish and Game, vol. 20, no. 4, p. 375-384, 6 figs., 1 tbl.
Historical account; gear and methods, fluctuations in catch, poundage deliveries by species and district 1916-1933; areas of fishing, demand, price, bait used.

Shapovalov, Leo
1940a. Report on a survey of a proposed planting base in Glenn County and certain waters in Glenn and Colusa Counties. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-14, 9 p. (Typewritten)
Study at request of Willows Sportsmen's Club to determine any improvements in distribution; description of area, proposed pond site, water temperature, spawning possibilities; recommendations for stocking.

Shapovalov, Leo
1940b. Report of four reservoirs in Napa and Solano Counties. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-13, 17 p., 5 figs. (Typewritten)
Description, physical characteristics, species present, temperature, migration and spawning, availability of fish, rearing ponds.

Sumner, F. H. and O. R. Smith
1940. Hydraulic mining and debris dams in relation to fish life in the American and Yuba Rivers of California. Calif. Fish and Game, vol. 26, no. 1, p. 2-22, 10 figs.
Summary of 1938 biological survey report submitted to Corps of Engineers; physical features of rivers, history of mining and dams, distribution and records of fish, effect of debris dams and mining debris on fish and fish foods, natural erosion; concludes that renewed hydraulic mining only slightly detrimental to sport fishing.

Wales, J. H.
1942. Carp control works in Lake Almanor, 1941. Calif. Fish and Game, vol. 28, no. 1, p. 28-33, 2 figs.
Methods of control, spawning habits and habitat; egg deposition, movement and attachment; size and sex composition of catch.

Dill, W. A.
1944a. The Colorado River survey—1942; Book I: dams, diversions, pumps. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-9, 74 p., 37 figs. (Typewritten)
Detailed description of all man-made projects (except Hoover Dam) that affected or would affect lower river fishery; designed to supplement Dill (1944b); only report offering complete picture of dams, diversions and interrelationships; concludes that, in general, river developments augur well for fishery.

Dill, W. A.
1944b. The fishery of the Lower Colorado River. Calif. Fish and Game, vol. 30, no. 3, p. 109-211, 38 figs., 7 tbls.
General description of river basin, physical and chemical conditions influencing fishery, biological factors, effect of dams and diversions, fishing intensity and methods; specie characteristics, distribution, abundance, habitat, size, growth, condition, reproduction, food, predation, importance to fishery: p. 151-153.
See Dill (1944a) for supplement.

Hallock, R. J.
1949. Fresh water rough fish. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 57-63, 4 figs.
Introduction and success; methods, principal areas, value of catch.

Wohlschlag, D. E. and C. A. Woodhull
1953. The fish populations of Salt Springs Valley Reservoir, Calaveras County, California. Calif. Fish and Game, vol. 39, no. 1, p. 6-44, 13 figs., 15 tbls.; especially p. 26-29 and 40-41.
Description and history of area, introduction of species, October 1947 rotenone treatment, restocking; marking and recovery data, recruitment, effects of natural and fishing mortality, management problems; weight, length-weight relationship, population estimate of 68,100; recommends removal as bass forage.

CATFISH

Ictalurus catus (Linné)
Ameirus nebulosus nebulosus

Neale, George
1915. The catfish in California. Calif. Fish and Game, vol. 1, no. 2, p. 62-64.
Describes successful 1874 introduction; habitat preference, temperature toleration, time and place of spawn, migrations, predations, importance as food fish, abundance, methods of catch, effect of restrictive legislation; includes incidental discussion of deadly fyke net.

Neale, George
1931. Catfish. *In* The spiny-rayed game fishes of the California inland waters. Calif. Fish and Game, vol. 17, no. 1, p. 13, Plates 9 and 10.
Notes transplantings and habitat.

Croker, R. S.
1934. The freshwater commercial fisheries of California. Calif. Fish and Game, vol. 20, no. 4, p. 375-384, 6 figs., 1 tbl.
Historical account; gear and methods, fluctuations in catch, poundage deliveries by species and district 1916-1933; areas of fishing, demand, price, bait used.

Nidever, H. B.
1937. Catfish. *In* The commercial fish catch of California for the year 1935. Calif. Div. Fish and Game, Fish Bull. 49, p. 58-61, 3 figs.
Introduction and success, species composition, commercial fishery methods and history, regulations.
Note: adaptation appears in *Calif. Conservationist*, vol. 2, no. 12, p. 9, 23 (1937).

Scofield, W. L.
1939. Catfish in Bixby Slough. Calif. Fish and Game, vol. 25, no. 1, p. 49-50.
Records 1937-1938 appearance in shallow fresh-water marsh near Wilmington; stories of intentional planting and accidental liberation; fishing pressure relief possibility.

Shapovalov, Leo
1940. Report on mass deaths of fork-tailed catfish in Clear Lake, California, in March and April, 1940. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 40-9, 9 p. (Processed)
Size and number of specimens, bottom temperature, symptoms, vertical "hanging," spawning times, possible explanations.

Sumner, F. H. and O. R. Smith
1940. Hydraulic mining and debris dams in relation to fish life in the American and Yuba Rivers of California. Calif. Fish and Game, vol. 26, no. 1, p. 2-22, 10 figs.
Summary of 1938 biological survey report submitted to Corps of Engineers; physical features of rivers, history of mining and dams, distribution and records of fish, effect of debris dams and mining debris on fish and fish foods, natural erosion; concludes that renewed hydraulic mining only slightly detrimental to sport fishing.

Wales, J. H.
1943. Report on investigations on Clear Lake, Lake County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 43-4, 24 p., 2 figs., tbls. in text. (Typewritten)
Description of program undertaken to determine whether commercial fishing permit should be extended; seining methods; species concerned, abundance, distribution, stomach content analysis, length, weight, growth rate, predation; catch records, water level, fish loss through Cache Creek outlet gate.

Dill, W. A.
1944a. The Colorado River survey—1942; Book I: dams, diversions, pumps. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 44-9, 74 p., 37 figs. (Typewritten)
Detailed description of all man-made projects (except Hoover Dam) that affected or would affect lower river fishery; designed to supplement

Dill (1944b); only report offering complete picture of dams, diversions and interrelationships; concludes that, in general, river developments augur well for fishery.

Dill, W. A.
1944b. The fishery of the Lower Colorado River. Calif. Fish and Game, vol. 30, no. 3, p. 155-161.
General description of river basin, physical and chemical conditions influencing fishery, biological factors, effect of dams and diversions, fishing intensity and methods; specie characteristics, distribution, abundance, habitat, size, growth, condition, reproduction, food, predation, importance to fishery.
See Dill (1944a) for supplement.

Murphy, G. I.
1946. Clear Lake, Lake County, investigation: progress report no. 1. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 46-17, 6 p.
Physical and ecological attributes of lake, fishing effort and success, species present, measurements, scale samples, catch records, limnological data; management recommendations.

Warner, G. H.
1949. Catfish. *In* The commercial fish catch of California for the year 1947 with an historical review, 1916-1947. Calif. Div. Fish and Game, Fish Bull. 74, p. 53-57, 3 figs.
Introduction and success; effect of legal restrictions against commercial fishery; history, areas, methods, value of catch.

Pelgen, D. E.
1951. The use of vertebrae in the age determination of the white catfish *Ictalurus catus* Linné. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 51-5, 9 p., 1 tbl. (Typewritten)
Attempt to devise methodology; method of preparation, interpretation of marks, application, annual deposition.

Pelgen, D. E.
1952. A preliminary analysis of the catfish fishery of the Sacramento-San Joaquin Delta. Calif. Dept. Fish and Game, Bur. Fish Cons., Adm. Rept. 52-23, 10 p., 3 figs., 1 tbl. (Typewritten)
Extent and history of sport and commercial fishery; decline in abundance, catch per angler, total catch; concludes that population overfished; recommends discontinuance of commercial fishery.

McCammon, G. W.
1953. Lake Wohlford, San Diego County, catch record analysis, 1950-1952. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 53-6, 10 p., 3 tbls. (Typewritten)
Angling intensity, success, quality; catch composition; notes abrupt 1952 decrease in fishing success.

Wohlschlag, D. E. and C. A. Woodhull
1953. The fish populations of Salt Springs Valley Reservoir, Calaveras County, California. Calif. Fish and Game, vol. 39, no. 1, p. 6-44, 13 figs., 15 tbls.; especially p. 30-31.
Description and history of area, introduction of species, October 1947 rotenone treatment, restocking; marking and recovery data, recruitment, effects of natural and fishing mortality, management problems; notes small unimportant but permanently established population.

Pelgen, D. E.
1954. Progress report on the tagging of white catfish (*Ictalurus catus*) in the Sacramento-San Joaquin Delta. Calif. Fish and Game, vol. 40, no. 3, p. 313-321, 6 figs., 1 tbl.
Summary of preliminary data of program initiated because of 1952 serious decline; methods, type and locality of tagging 3466 specimens; migration; notes sporadic, directionless, speedy nature of movement.
See Pelgen and McCammon (1955).

Donaldson, Don
1955. Cats in the bypass. *Outdoor California*, vol. 16, no. 8, p. 6-7, 2 figs.
Details of tagging program 1953-56; fishing pressure, success, quality.

Pelgen, D. E. and G. W. McCammon
1955. Second progress report on the tagging of white catfish (*Ictalurus catus*) in the Sacramento-San Joaquin Delta. Calif. Fish and Game, vol. 41, no. 4, p. 261-269, 2 figs., 4 tbls.
Preliminary results of experiment comparing two types of tags; methods; movements, annual harvest data; tag returns, tag suitability; estimates 17% available population harvested in 1953 by sport and commercial fishermen; notes no evidence of regular seasonal migration.
See Pelgen (1954).

McCammon, George
1957. Anglers "purr" as delta catfish study pays off. *Outdoor California*, vol. 18, no. 3, p. 12-14.
Report of investigations carried out under state's first freshwater federal aid project 1952-56; fishing intensity, effect of commercial fishery, legislation, tag return results; concludes spawn during June and July in 70° water; average 1,000 egg production; maturity reached during third and fourth years; growth slow but steady; diet primarily small invertebrates, over 30% amphipod.

CRAPPIE

Pomoxis annularis (Rafinesque)
Pomoxis nigro-maculatus (LeSueur)

Neale, George
1931. Crappie. *In* The spiny-rayed game fishes of the California inland waters. Calif. Fish and Game, vol. 17, no. 1, p. 11, color plate.
Notes introduction.

Wales, J. H.
1943. Report on investigations on Clear Lake, Lake County, California. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 43-4, 24 p., 2 figs., tbls. in text. (Typewritten)
Description of program undertaken to determine whether commercial fishing permit should be extended; seining methods; species concerned, abundance, distribution, stomach content analysis, length, weight, growth rate, predation; catch records, water level, fish loss through Cache Creek outlet gate.

Dill, W. A.
1944. The fishery of the Lower Colorado River. Calif. Fish and Game, vol. 30, no. 3, p. 109-211, 38 figs., 7 tbls.
General description of river basin, physical and chemical conditions influencing fishery, biological factors, effect of dams and diversions, fishing intensity and methods; specie characteristics, distribution, abundance, habitat, size, growth, condition, reproduction, food, predation, importance to fishery: p. 167-168.

Hagy, R. H.
1956. A preliminary report on the white crappie, *Pomoxis annularis* (Rafinesque), and black crappie, *Pomoxis nigromaculatus* (Le Sueur), in Northern California. Calif. Dept. Fish and Game, Inland Fish. Br., Adm. Rept. 56-3, 8 p., 1 fig., 2 tbls. (Processed)
Study to evaluate Northern California introduction of species ranking fourth in 1953 state-wide angling estimate; growth, length, weight, overpopulation possibility.

SACRAMENTO PERCH

Archoplites interruptus (Girard)

Rutter, Cloudsley
1907. The fishes of the Sacramento-San Joaquin basin, with a study of their distribution and variation. U. S. Bur. Fish., Bull., vol. 27, doc. 637, p. 143.
Description, abundance, quality as food fish, probable causes of depletion.

Murphy, G. I.
1948a. A contribution to the life history of the Sacramento perch (*Archoplites interruptus*) in Clear Lake, Lake County, California. Calif. Fish and Game, vol. 34, no. 3, p. 93-100, 4 figs.
Reproductive habits, growth, feeding habits; reduction in numbers; notes status as zoological rarity and threats to population by introduction of alien species into habitat.

Murphy, G. I.
1948b. Experiments on the tolerance of Sacramento perch to copper sulphate. Calif. Div. Fish and Game, Bur. Fish Cons., Adm. Rept. 48-18, 3 p., 1 tbl. (Typewritten)
Methods and materials; notes tentative conclusion that perch able to resist copper suphate in quantities of 0.5 ppm in Clear Lake.

Curtis, Brian
1949. Sacramento perch. *In* The warm-water game fishes of California. Calif. Fish and Game, vol. 35, no. 4, p. 265, color plate no. 5.
General review of known facts and previous studies; geographic range, identifying characteristics; original distribution and abundance; spawning practices as described in Murphy (1948a); fishing methods.

Dineen, C. F. and P. S. Stokely
1956. The osteology of the Sacramento perch, *Archoplites interruptus* (Girard). *Copeia*, no. 4, p. 217-230, 13 figs.
Descriptive study of skeletal formation based on fourteen specimens.

MIGRATORY WATERFOWL

GENERAL

O'Roke, E. C.

1928. Intestinal parasites of wild ducks and geese. Calif. Fish and Game, vol. 14, no. 4, p. 286-296, 2 figs., 1 tbl.

Progress report of surveys begun with opening of 1927 season; locality, number of birds infected, species of parasites, percentage parasitized, relative immunity, feeding habits; methods and materials of parasite collection.

Moffitt, James

1934a. Recent researches into the migratory waterfowl problems on the Pacific coast. Fifth Pac. Sci. Cong., Proc., p. 4081-4094.

History of decline, reduction of breeding and wintering grounds, administration of Migratory Bird Treaty Act; California problems and research efforts; effects of drought, reclamation, disease and hunting; refuge establishment, banding.

Moffitt, James

1934b. Revised estimate of 1933 California waterfowl abundance. Calif. Fish and Game, vol. 20, no. 2, p. 167-168.

Notes optimistic nature of Moffitt (1934c); reports from wardens, total kill, hunter success, population estimates.

Moffitt, James

1934c. Waterfowl abundance in California, 1933. Calif. Fish and Game, vol. 20, no. 2, p. 78-79.

Report of conditions ten days prior to season's close; statewide records of species' abundance; notes inconclusive nature of findings.

See Moffitt (1934b).

Kortright, F. H.

1943. The ducks, geese and swans of North America. The Amer. Wild. Inst., 476 p., figs. and tbls. in text, 36 color pls. in appendix.

Distribution, range, habits and habitat, life history notes; description, speciation.

Hart, R. N.

1947. Duck depredation problems in the Imperial Valley, California. West. Assoc. State Game and Fish Comm., 27th Ann. Conf., Proc., p. 169-172.

Effect of irrigation water introduction and resulting agricultural crops, depredations by geese, pintails and baldpates, methods of control, effect of feeding areas and airplane herding.

Chattin, J. E.

1949. The Pacific flyway waterfowl program. West. Assoc. State Game and Fish Comm., 29th Ann. Conf., Proc., p. 30-32.

Summary of activities of cooperative organization composed of British Columbia, U. S. and six western states' agencies; method of composite reports, key census areas, band returns, productivity and kill; notes that over 35,000 banded.

Horn, E. E.

1949. Waterfowl damage to agricultural crops and its control. 14th No. Amer. Wild. Conf., Trans., p. 577-586.

Historical development of flyway areas, drainage, reclamation, irrigation; crop losses, protection methods, herding programs, experimental feeding areas, land and equipment for management areas.

Note: also appears, with slight adaptation, as "Waterfowl depredations," West. Assoc. State Game and Fish Comm., 29th Ann. Conf., Proc., p. 102-106 (1949).

Biehn, E. R.
1951. Crop damage by wildlife in California, with special emphasis on deer and waterfowl. Calif. Dept. Fish and Game, Game Bull. 5, p. 44-67, 15 figs.
History of depredations, population utilization of flyway, habitat abundance, decrease in natural feeding and resting areas, nature of damage, crop preference by species, experimental area in San Joaquin County, four general areas of damage distribution, damage trends, control methods; concludes main causes as reduction in natural feeding and resting areas occasioned by draining marshes for agriculture, creation of Salton Sea, and growing agriculture crops by irrigation in desert area.
Note: adapted from MA thesis, Coll. of Pacific.

Stokes, J. D.
1951. Waterfowl management program for California. West. Assoc. State Game and Fish Comm., 31st Ann. Conf., Proc., p. 181-183.
Development of program to correct imbalance between wintering and breeding grounds; agricultural damage, protection, feeding and resting areas.

Rudd, R. L. and R. E. Gennelly
1956. Pesticides: their use and toxicity in relation to wildlife. Calif. Dept. Fish and Game, Game Bull. 7, 209 p., 2 figs., 33 tbls.
Report of study designed to accumulate data on toxicity and uses of agricultural chemicals, to determine extent of wildlife loss from their use and to provide reference data for other research technicians; major legislation in field, production of pesticides, California acreage treated and amounts used, wildlife losses in California, toxicity vs. hazard, special problems and areas, significance of losses; recommendations for research, use and legislation; accounts of pesticides.

PACIFIC BLACK BRANT

Branta bernicla nigricans

Moffitt, James
1931. First annual black brant census in California. Calif. Fish and Game, vol. 17, no. 4, p. 396-401, 4 figs.
Dependence on eel-grass, migrations, maritime habits, areas, estimated population.

Moffitt, James
1932. Second annual black brant census in California. Calif. Fish and Game, vol. 18, no. 4, p. 298-310, 7 figs.
Continuation of work noted in Moffitt (1931); method of census; arrival time on eel-grass growth at Humboldt, Bodega, Tomales, Drakes, Morro, Mission and San Diego Bays; migration patterns from south; description, habits, breeding range.

Moffitt, James
1933. Third annual black brant census in California. Calif. Fish and Game, vol. 19, no. 4, p. 255-263, 3 figs.
Continuation of population count program except at Morro Bay; notes unusual late arrival; counts from Alaska, British Columbia, Washington and Oregon; incidental mention of gulls, cormorants and surf scooters feeding on enormous numbers of Pacific herring spawning in inner Tomales Bay; notes importance of eel-grass to herring and oysters.

Moffitt, James
1934. Fourth annual black brant census in California. Calif. Fish and Game, vol. 20, no. 4, p. 355-364.
Continuation of census work, plus recapitulation of earlier counts; 1933 fall migration; census in Oregon, Washington, and British Columbia; need for improved method of counting.

Moffitt, James
1935. Fifth annual black brant census in California. Calif. Fish and Game, vol. 21, no. 4, p. 343-350, 1 tbl.
Continuation of census work at Humboldt, Bodega, Tomales, Drake's, Morro, Mission and San Diego Bays; estimated population; effect of federal regulation prohibiting waterfowl shooting from boats or blinds more than one hundred feet from shore.

Moffitt, James
1936. Sixth annual black brant census in California. Calif. Fish and Game, vol. 22, no. 4, p. 295-300.
Continuation of program; fluctuations, arrivals, increase in numbers.

Moffitt, James
1937. Seventh annual black brant census in California. Calif. Fish and Game, vol. 23, no. 4, p. 290-295, 1 tbl.
Continuation of population counting; migrations; oil-incapacitated specimens.

Moffitt, James
1938. Eighth annual black brant census in California. Calif. Fish and Game, vol. 24, no. 4, p. 341-346, 1 tbl.
Continuation of count; population by areas.

Moffitt, James
1939. Ninth annual black brant census in California. Calif. Fish and Game, vol. 23, no. 4, p. 290-295, 1 tbl.
Continuation of population count; notes increase; importance of eel-grass to herring and oysters.

Moffitt, James
1940. Tenth annual black brant census in California. Calif. Fish and Game, vol. 26, no. 4, p. 381-389, 1 tbl.
Continuation of population count.

Moffitt, James
1941. Eleventh annual black brant census in California. Calif. Fish and Game, vol. 27, no. 4, p. 216-233, 5 figs., 1 tbl.
Continuation of count program; notes alarming shortage of eel-grass and presence of parasite *Labyrinthula;* effect on population; national defense efforts and adverse effect.

Moffitt, James and Clarence Cottam
1941. Eel-grass depletion on the Pacific coast and its effect upon black brant. U. S. Fish and Wildlife Ser., Wild. Leaflet 204, 26 p., 1 tbl.
Distribution and importance of marine pondweed, *Zostera marina;* 1931 Atlantic coast destruction and effects; reproduction, growth, variations; effects of blight on waterfowl, Pacific coast situation historically; importance of California's bays, brant behavior and census results, wintering tendencies; notes gradual Pacific coast decrease in eel-grass abundance since 1938; food habits and general behavior of brant changed markedly where eel-grass scarce.
Note: bibliography, p. 21-26, contains world-wide eel-grass studies.

Harrison, E. N.
1942. Records of the American brant and European widgeon at Tule Lake, California. *Condor*, vol. 44, no. 3, p. 130.
Notes inland flying rather than coastal migration route.

Moffitt, James
1943. Twelfth annual black brant census in California. Calif. Fish and Game, vol. 29, no. 1, p. 19-28, 2 tbls.
Results of study to determine status of population and effect of eel-grass depletion; notes mild effect of *Labyrinthula* infection.

Cottam, Clarence, J. J. Lynch and A. C. Nelson
1944. Food habits and management of American sea brant. J. Wild. Man., vol. 8, no. 1, p. 36-56, 3 figs., 4 tbls.
Distribution, east and west coast population fluctuations, banding, longevity, migration, flight; food items by volume and percentage; weight and measurements, nesting and feeding grounds, nesting success, management problems, hunting.

Leopold, A. S. and R. H. Smith
1953. Numbers and winter distribution of Pacific black brant in North America. Calif. Fish and Game, vol. 39, no. 1, p. 95-101, 1 fig., 1 tbl.
Report of 1952 inventory; methods; numbers and locations; notes 1951-52 winter crop depredation similar to 1940-41 situation when eel-grass attacked by disease; possibility of loss of carrying capacity in natural feeding areas; concludes that of 174,740 population, 63% in Baja California, 25% in California, 9% in Puget Sound; no apparent alteration or serious destruction of necessary habitat.
Note: see Moffitt (1941) for 1940-41 eel-grass disease condition.

DUCKS

Mallard *Anas platyrhynchos*
Cinnamon teal *Anas cyanoptera*
Green-winged teal *Anas crecca*
Pintail *Anas acuta*
Baldpate (widgeon) *Mareca americana*
Shoveller (spoonbill) *Spatula clypeata*
Ruddy duck *Oxyura jamaicensis*
Canvasback *Aythya valisineria*
Redhead *Aythya americana*
Lesser scaup (blue-bill) *Aythya affinis*

Goldman, E. A.
1908. The green-winged teal (*Nettion carolinensis*) breeding in California. *Condor*, vol. 10, no. 3, p. 129.
Notes nest contents on shore of Tulare Lake as apparently first record.

Torrey, Bradford
1909. The blue-winged teal at Santa Barbara. *Condor*, vol. 11, no. 5, p. 173-174.
Observations of individuals in artificial lakes, ditches and pools; cover available.

Torrey, Bradford
1910. The cinnamon-teal (*Querquedula cyanoptera*) wintering at Santa Barbara. *Condor*, vol. 12, no. 2, p. 80.
Notes dates and numbers of birds during two-year period.

Clarke, F. C.
1913. Preliminary report upon the disease occurring among the ducks of the southern San Joaquin Valley during the Fall of 1913. *Condor*, vol. 15, no. 6, p. 214-226, 12 figs.
Report of investigation at Soleta and Tulare Lakes; description of areas; food supply, numbers species of dead birds; experimental work on confined specimens.

Bryant, H. C.
1914. A survey of the breeding grounds of ducks in California in 1914. *Condor*, vol. 16, no. 4, p. 217-239, 9 figs.
Description of areas, abundance of species; location and description of nests, contents; predation; description and development of young; market hunting, need for added protection, predator control, regulation of water.

Grinnell, Joseph and H. C. Bryant
1915. The wood duck in California. Calif. Fish and Game, vol. 1, no. 2, p. 49-52.
Description, distribution, habits, habitat; discussion of early records of nesting behavior; comments on nearly extinct status and need for protection.

Mailliard, Joseph
1915. Scaup ducks breeding in Golden Gate Park, San Francisco. *Condor*, vol. 17, no. 6, p. 235.
Observations on young; notes record for latitude and locality.

Squires, W. A.
1915. Nesting of wild ducks near San Francisco. *Condor*, vol. 17, no. 6, p. 234-235.
Nest, egg and young observations in Merced and Stow Lakes.

Dirks, W. N.
1916. Green-winged teal nesting in Alameda County. Calif. Fish and Game, vol. 2, no. 1, p. 46.
1915 observation of young in Alvarado Marsh nest, establishing this area in addition to sites previously recorded in Ventura County, Tulare Lake and Sierra Valley in Plumas County.

Neale, George
1916. Ducks versus rice. Calif. Fish and Game, vol. 2, no. 1, p. 49.
Article contrasting newspaper accounts of Sacramento valley rice field damage by ducks and various personal observations of feeding habits; cites evidence indicating ducks glean waste rice fallen or knocked from heads.

Lamb, C. C.
1922. Summer record of blue-winged teal in California, and notes on other birds. *Condor*, vol. 24, no. 1, p. 28-29.
Observation of pair at Buena Vista Lake, Kern County; conditions of testes.

Hobmaier, M.
1930. Duck disease caused by the poison of the *Bacillus botulinus*. Calif. Fish and Game, vol. 16, no. 4, p. 285-286.
Progress report of experiments isolating causative organism.
See Hobmaier (1932) for final report.

Moffitt, James
1931. The status of the blue-winged teal in California. *Condor*, vol. 33, no. 6, p. 247-248.
Observations in Los Angeles, Lassen and Siskiyou Counties; numbers of birds, condition of testes, molt, broods, young.

Hobmaier, M.
1932. Condition and control of botulism (duck disease) in waterfowl. Calif. Fish and Game, vol. 18, no. 1, p. 5-21, 5 figs.
Continuation of Hobmaier (1930); history of disease spread, symptoms and post-mortems, theories of previous observers; cause, development and duration; affected birds, botulinus and food poisoning, effect on barnyard fowl, diagnosis and experiments, condition on ponds, suggestions for control; concludes that so-called western duck sickness due to *Bacillus botulinus* type C. intoxication; suggest installation of sanitary measures in polluted waters.

Hill, H. H.
1938. Some waterfowl nesting records from vicinity of Redlands, California. *Condor*, vol. 40, no. 1, p. 40.
Observations of broods of pintail, cinnamon teal, ruddy duck.

Rowley, J. S.
1939. Mallard. *In* Breeding birds of Mono County, California. *Condor*, vol. 41, no. 6, p. 247.
Habitat description; nest location, construction and contents; young.

True, G. H., Jr.
1940. Duck disease. *Calif. Conservationist*, vol. 5, no. 6, p. 1-3, 7 figs., 1 tbl.
History of epidemic outbreak in California, number and species affected, treatment.

Mays, A. S.
1941. Observations on duck disease at Tulare Lake Basin, 1940. Calif. Fish and Game, vol. 27, no. 3, p. 154-164.
Description and effects of botulism, condition of outbreak, symptoms, control measures.

Freyschlag, C. H.
1942. Blue-winged teal nesting in Sacramento County. *Condor*, vol. 44, no. 5, p. 227-228.
Observations on brood of seven young near Elk Grove bass hatchery.

Hunter, J. S.
1942. Blue-winged teal with young in Honey Lake Valley, California. *Condor*, vol. 44, no. 5, p. 228.
Observation north of Hartson Lake.

Herman, C. M.
1943. An outbreak of mycotic pneumonia in mallards. Calif. Fish and Game, vol. 29, no. 4, p. 204.
Notes October 1941 epidemic in Modoc County; description of area, concentration of birds.

Herman, C. M. and G. L. Bolander
1943. A parasite in the muscles of ducks in California. Calif. Fish and Game, vol. 29, no. 3, p. 148-149, 1 fig.
First report of infected pintail west of Rocky Mountains; notes very low prevalence.

McLean, D. D.
1946. Duck disease at Tulare Lake. Calif. Fish and Game, vol. 32, no. 2, p. 71-80, 2 figs., 5 tbls.
Effect of 1937-1938 spring floods; seasonal records of sick birds; conditions for spread of botulism and correlation with weather, water and air temperatures, wind velocity and direction.

Earl, J. P.
1949. Production of mallards on irrigated land in the Sacramento Valley. Univ. Calif., MA thesis, 23 p., 4 figs., 7 tbls. (Typewritten)
Description of Conway Ranch study area southeast of Woodland, Yolo County; farming, irrigation, cover types, pre-nesting and nesting periods, nest cover and success, post-breeding censuses; concludes April 1st-middle August nesting season; breeding territories located along irrigation ditches; 70-yard average territory, 10-day average occupancy period; April 5-9 peak territorial behavior of 400 pairs; 52% hatching success with 6.9 average; gradual seasonal decrease in brood size; hatching failures due mostly to predation by skunks, raccoons and feral house cats; 2000 post-breeding census total; gross production of one bird per fifteen acres, or one bird per 2.8 acres of rice.
Note: also appears in J. Wild. Man., vol. 14, p. 332-342 (1950).
See Mayhew (1953) for repeated study with very different results.

Krutzsch, P. H.
1949. An extension of the altitudinal nesting range of the pintail in California. *Condor*, vol. 51, no. 5, p. 232-233.
Observations at Bodie, Mono County; description of area, lack of cover, nest site under bush, parents and young; extends altitudinal range to 8374 feet.

McLean, D. D.
1950. Duck banding at Tulare Lake. Calif. Fish and Game, vol. 35, no. 2, p. 75-117, 10 figs., 22 tbls.
Pickup and banding of birds affected by botulism; annual dates of maximum population, area affected by botulism, estimated duck loss; numbers banded and release yearly by specie; return maps, population mixture and nonmixture, terminal area of migration routes.

Dollahite, Ned and M. P. Anderson, Jr.
1952. A new nesting record for the cinnamon teal in Humboldt County, California. *Condor*, vol. 54, no. 5, p. 320.
Description of area, dominant plant cover; site and description of nest, water depth; contents of ten eggs.

Mayhew, W. W.
1953. Spring rainfall in relation to mallard production, Sacramento Valley, California. Univ. Calif., Ph. D. thesis, 34 p., 3 figs., 3 tbls. (Typewritten)
Result of investigation into causes of tremendous drop in breeding performance reported in Earl (1949); population estimate, nesting success and sites, humidity requirements, incubation experiments in five relative humidities and warm water dipping; concludes that direct application of water to egg necessary factor in successful hatch; maintenance of moderately high relative humidity of secondary importance; year to year variation in hatching success of mallards in area related to frequency and timing of direct wetting of eggs by rainfall; spring rainfall useful in predicting mallard crop.
Note: adaptation appears in J. Wild. Man., vol. 19, no. 1, p. 36-47 (1955).

Rosen, M. W. and J. B. Cowan
1953. Winter botulism: a sequel to a severe summer outbreak. West. Assoc. State Game and Fish Comm., 33rd Ann. Conf., Proc., p. 189-193, 1 tbl.
History of Butte Sink Basin and Gray Lodge State Refuge, and 1952 outbreak of disease; winter recurrence, estimated population, estimated numbers affected; temperature, rainfall, pond flooding data; concludes that resurgence followed each rainstorm; fall epizootic produced heavy concentrations of toxin in pond bottoms; unrecovered carcasses increased concentration; each storm washed additional toxin into ponds; further concentration by evaporation and slow drainage.

Miller, A. W. and B. D. Collins

1954. A nesting study of ducks and coots on Tule Lake and Lower Klamath National Wildlife Refuges. Calif. Fish and Game, vol. 40, no. 1, p. 17-37, 5 figs., 11 tbls.

Study of eleven sample areas comprising 1821 acres and review of 3814 brood counts; description of area, importance to Pacific Flyway as resting and feeding area and to California waterfowl as nesting area; development of refuges; location and description of selected plots; nest location, fate and success; flooding, desertion and destruction; egg fate, clutch size, brood data, hatching dates; site-cover relationship by species; concludes that 83.4% nesting success; desertion, flooding, predation major causes of failures; 91.6% hatching success; major reduction of brood size in first week; nettle most important cover.

Note: report appears in West. Assoc. State Game and Fish Comm., 33rd Ann. Conf., Proc., p. 182-188 (1953).

Outdoor California

1954. Mendota: vital flyway link. Vol. 15, no. 12, p. 8, 2 figs.

Acquisition, location, description of 8585-acre area for $1,114,000.

Hunt, E. G. and A. E. Naylor

1955. Nesting studies of ducks and coots in Honey Lake Valley. Calif. Fish and Game, vol. 41, no. 4, p. 295-314, 4 figs., 9 tbls.

Description and history of study area; methods, selection of plots; nest sites, cover types, nest fate, nesting period, fate of eggs and clutch size, brood data; based on 559 nests, concludes that hatching peak June 1-30; 52.5% nesting successful; 91.7% hatching success; predation major cause of destruction.

Miller, A. W.

1955. What do Sacramento Valley ducks eat? *Outdoor California*, vol. 16, no. 12, p. 9, 2 figs.

Results of 688 gizzard analyses; food item composition, volume, frequency; concludes that watergrass and aquatics used heavily in fall; heavy rice useage beginning in September; watergrass consumption decreased as season progresses; waste rice consumption remained heavy until spring; insects became important toward spring.

Outdoor California

1955. Waterfowl pose California problem. Vol. 16, no. 9, p. 1, 3-11, 12 figs.

History of Pacific flyway wintering population and agriculture conflict; arrivals and departures, population estimates, agriculture damage, control measures, management areas, supplemental feeding.

Rudd, R. L. and R. E. Genelly

1955. Avian mortality from DDT in California rice fields. *Condor*, vol. 57, no. 2, p. 117-118, 1 tbl.

Report of investigation in areas of sowing DDT-coated grain applied to control tadpole shrimp and scavenger beetle damage to seedlings; crop and gizzard analyses; detectable mortality during sowing period; results of experimental feeding; notes effect of applying chemical and seed separately; species as mallard and pintail.

Anderson, William

1956a. A waterfowl nesting study in the Sacramento Valley, California, 1955. Calif. Fish and Game, vol. 43, no. 1, p. 71-9, 5 figs., 14 tbls.

Brief review of previous studies; history of study area, procedure; descriptions of study plots, nesting periods, fate of nests, predation, fate of eggs, cover type, distance from water; concludes that 93% of nests mallard, remainder cinnamon teal and gadwall; 38.4% hatching success, 9.3% deserted, 52.3% destroyed; peak of hatch May 20-July 10; 7.2 average hatch; skunk, Norway rat, raccoon principal predators; more intensive predator control key to increased production.

Anderson, William

1956b. A waterfowl nesting study on the Grasslands, Merced County, California. Calif. Fish and Game, vol. 42, no. 2, p. 117-130, 2 figs., 13 tbls.

Report of study to determine changes in area since Miller (1948); methods; description of area, choice of plots, species present; predators, relationship with grazing of livestock; nesting periods, nest sites and

cover, brood data; concludes that nesting failure due to predation on alarming increase; diversion of water for agricultural purposes resulted in serious reduction of suitable nest habitat; skunk and opossum main predators; recommends increased water supply in order to lessen vulnerability to predator attacks, to increase chances for young survival, to decrease desirable skunk and opossum habitat; concentrated predator trapping program on selected areas.

Yocom, C. F. and W. A. Wooten

1956. Blue-winged teal in Del Norte County, California. Calif. Fish and Game, vol. 42, no. 1, p. 81.

Observations of mated pair and brood in vicinity of Earl and Talawa Lakes; description of area, habitat; represents northwesternmost breeding record.

Quortrup, E. R. and others

1957. Studies on the incidence of poultry diseases in wild ducks. Calif. Fish and Game, vol. 43, no. 2, p. 139-141, 2 tbls.

Study undertaken to obtain disease transmission data; methods; seological, virological study, blood chemistry determination; Newcastle disease and salmonellosis; notes possibility of ducks being immune carriers.

Yocom, C. F.

1957. Breeding record of pintail in Humboldt County, California. *Condor*, vol. 59, no. 5, p. 34-341.

Report of 1956 observation on southwest side of South Humboldt Bay; description of nest location, clutch of nine eggs.

GEESE

Canada goose *Branta canadensis*
White-fronted goose *Anser albifrons*

Belding, Lyman
1892. Geese which occur in California. *Zoe*, vol. 3, no. 2, p. 96-101.
Abundance, flock arrivals and departures, description of species, wintering and breeding populations.

Ray, M. S.
1912. Nesting of the Canada goose at Lake Tahoe. *Condor*, vol. 14, no. 2, p. 67-72, 4 figs.
Observations in marsh and slough area in southern end of lake and on Emerald Bay island; location, description and contents of nests; size, shape, color of eggs; capture and raising of young.

Swarth, H. S.
1913. A study of a collection of geese of the *Branta canadensis* group from the San Joaquin Valley, California. Univ. Calif. Publ. Zool., vol. 12, no. 1, p. 1-24, 8 figs.
Discussion of four forms based on 153 skins; description, habitat, occurrence, breeding populations, previous confusion in literature; concludes one species *B. canadensis*, with four subspecies, *canadensis, occidentalis, hutchinsi* and *minima; B. c. canadensis* California breeding form; *B. c. occidentalis* not occurring in California.

Church, S. C.
1915. Canadian geese numerous in Sacramento Valley. Calif. Fish and Game, vol. 1, no. 3, p. 132.
Flight behavior, seasonal variations in arrival.

Bryant, H. C.
1916. Canada geese successfully bred in California. Calif. Fish and Game, vol. 2, no. 1, p. 47.
Records attempts to raise honkers indicate successful rearing occurs only at elevation of over 2,000 feet.

Swarth, H. S. and H. C. Bryant
1917. A study of the races of the white-fronted goose (*Anser albifrons*) occurring in California. Univ. Calif. Publ. Zool., vol. 17, no. 11, p. 209-222, 2 figs., 1 tbl.
Description and habitat preference of *albifrons* and *gambeli*.

Moffitt, James
1926. Notes on the white-fronted and tule geese in Central California. *Condor*, vol. 28, no. 5, p. 241-243.
Observations on Suisun Marshes, Solano County; arrival dates, size of specimens, flock composition, feeding, voice quality.

Moffitt, James
1931a. Banding Canada geese in California in 1931. *Condor*, vol. 33, no. 6, p. 229-237, 4 figs.
Experiment at Honey Lake, Lassen County; methods and materials; breeding grounds, population estimate, molting; concludes that young fly at seven-eight weeks after hatch; most adults flightless just before young fly.

Moffitt, James
1931b. The status of the Canada goose in California. Calif. Fish and Game, vol. 17, no. 1, p. 20-26, 4 figs.
Range, relationship, description; breeding areas in elevated lakes of Lassen and Modoc Counties and in Rowlands Marsh between Bijou and Tallac on Lake Tahoe; development, habits, wintering areas; need to keep breeding grounds intact.

Moffitt, James
1939. Notes on the distribution of whistling swan and Canada goose in California. *Condor*, vol. 41, no. 3, p. 95-97.
Notes that breeding range closely parallels mule deer summer range; breeding sites, pair estimates; winter residency, effect of winter; clutch size; photoperiodism and migratory urge; estimates annual breed of 1200 pairs in California.

Dow, J. S.
1943. A study of nesting Canada geese in Honey Lake Valley, California. Calif. Fish and Game, vol. 29, no. 1, p. 3-18, 10 figs., 1 tbl.
Results of 1939-1940 general survey of all waterfowl breeding areas in northeastern California; case history of 318 nests, procedures, descriptions of nest sites; incubation, brood behavior, degree of nesting success, predators; management suggestions; recommends coyote control during prenesting season, water level regulation, fire control.

Miller, A. W. and B. D. Collins
1953. A nesting study of Canada geese on Tule Lake and Lower Klamath National Wildlife Refuges, Siskiyou County, California. Calif. Fish and Game, vol. 39, no. 3, p. 385-396, 5 figs., 4 tbls.
Sampling of 201 complete nest histories; history of areas, effect of agricultural developments, establishment as refuge; nest sites, cover types, fate of nests and eggs, nesting period, date of hatch, brood dates; concludes that muskrat houses and islands preferred sites; 78.6% nesting success, desertion major cause of failure, predation of little consequence; 87% hatching success, 5.13 average clutch with 4.43% average hatch; 1.9% infertility; 83-day nesting period, peak of hatch April 23-May 12.
Note: report also appears in West. Assoc. State Game and Fish Comm., 33rd Ann. Conf., Proc., p. 172-176 (1953).

Naylor, A. E.
1953. Production of the Canada goose on Honey Lake Refuge, Lassen County, California. Calif. Fish and Game, vol. 39, no. 1, p. 883-94, 3 figs., 3 tbls.
Description of study area, methods; nesting dates, cover; egg laying, hatching, fertility; destruction and desertion of nests, management; concludes that most nests under incubation by April 7; average clutch size 5.53 eggs; hatching success 82.6%; 2% infertility; recommends construction of islands and control of vegetation to increase annual production.

Naylor, A. E. and E. G. Hunt
1954. A nesting study and population survey of Canada geese on the Susan River, Lassen County, California. Calif. Fish and Game, vol. 40, no. 1, p. 5-16, 7 figs., 8 tbls.
Results of study to determine numbers using river and to obtain production data comparable to Honey Lake Refuge study reported in Naylor (1953); description and importance of area, nest sites, cover types, nesting period, hatching dates, fate of nests, brood data, population surveys and 1100-1300 estimate, age ratio of banded birds, habitat preference, effect of adverse weather on nesting time; concludes that nesting density along sixteen miles of river 3.6 nests per mile; ditchbanks preferred sites; 79.3% nesting success; river primarily nonbreeding and secondarily nesting area.

Kozlik, F. M.
1956. Color-marking white geese for determining migration routes. West. Assoc. State Game and Fish Comm., 36th Ann. Conf., Proc., p. 145-152, 2 tbls.
Limitations of leg banding for migration studies, development of dye markings, methods and materials of marking, observation reports through cooperation of Pacific Flyway Study Committee.

BIG GAME

GENERAL

Dasmann, W. P.
1958. Big game of California. Calif. Dept. Fish and Game, Informational booklet, 56 p., 36 figs.
Description, range, distribution, abundance; reproduction, feeding, life history notes; importance to hunting and economy, hunting seasons, habitat improvement, management principles.
Note: deer, p. 6-14; elk, p. 15-22; antelope, p. 23-28; bighorn sheep, p. 29-33; bear, p. 37-40; mountain lion, p. 41-44.

PRONGHORN ANTELOPE

Antilocapra americana

Bryant, H. C.
1915. Present status of prong-horn antelope. Calif. Fish and Game, vol. 1, no. 2, p. 77.
Reduction in numbers from 1849-1914, locations.

Nelson, E. W.
1925a. Distribution of the prong-horned antelope in California. Calif. Fish and Game, vol. 11, no. 4, p. 154-157, 1 fig.
Attempts at perpetuating remaining herds; shifting of herds for forage.

Nelson, E. W.
1925b. Status of the pronghorn antelope, 1922-1924. U. S. D. A., Bull. 1346, p. 25-27, 1 fig.
History of herds, shifting distribution, predation.

Cheney, E. S.
1929. Prong-horned antelope in California. Calif. Fish and Game, vol. 15, no. 2, p. 175.
Condition of herd, population estimation, habits, effects of sheep overgrazing; Lassen County herd migrations to Nevada.

Fisher, C. O.
1929. The antelope of Lassen County. Calif. Fish and Game, vol. 15, no. 4, p. 349-350, 1 fig.
Seasonal increases, migrations, protective measures.

Johnson, F. W.
1931. Antelope on the Shasta National Forest. Calif. Fish and Game, vol. 17, no. 2, p. 167-168, 1 fig.
Seasonal increases, effect of severe winters, trapping and removing.

Anderson, H. T., Jr.
1932. The pronghorn antelope. Calif. Fish and Game, vol. 18, no. 3, p. 258-259.
Observation on herd of seven individuals in Los Angeles County.
See Anderson (1934).

Anderson, H. T., Jr.
1934. The pronghorn antelope in Los Angeles County. Calif. Fish and Game, vol. 20, no. 1, p. 91-92.
Notes gradual disappearance of small herd in Antelope Valley five miles north of Sandberg.

California Conservationist
1939. The antelope census. Vol. 4, no. 2, p. 27.
Lassen County range report; 2382 count and estimate of total actual population.

California Conservationist
1941. Antelope. Vol. 6, no. 7, p. 8, 22, 1 tbl.
Report of aerial survey in Modoc and Lassen Counties; herd numbers and composition.

McLean, D. D.
1944. Prong-horned antelope in California. Calif. Fish and Game, vol. 30, no. 4, p. 221-241, 7 figs., 5 tbls.
Description, early records from 1540, original and present range, winter areas, migration, highways, life history and habits, census methods; estimates population at 6147 head.

Cook, B. B. and others
1949. The influence of seasonal and other factors on the acceptability and food value of the meat of two subspecies of California deer and of antelope. *Hilgardia*, vol. 19, no. 8, p. 265-284, 8 figs., 6 tbls.
Results of study to provide basis for determining proper hunting season; palatability tests; methods for vitamin, fat, moisture and protein analyses; test results and recommendations.

Chattin, J. E. and Robert Lassen
1950. California antelope reproductive potentials. Calif. Fish and Game, vol. 36, no. 3, p. 328-329, 3 tbls.
Report of information gathered during 1949-1950 trapping and transplanting operations in Lassen County; indicates sex ratio of male to female at birth of 84:100; high potential based on one single embryo and seventeen sets of twin embryos.

Ferrel, C. M. and H. R. Leach
1950. Food habits of the prong-horn antelope of California. Calif. Fish and Game, vol. 36, no. 1, p. 21-26, 3 tbls.
Stomach content analyses in other states; range in California, native vegetation, relation to agriculture; analysis of fifty-six stomach samples; concludes that 98% diet browse and forbs, sagebrush most important single item; no severe competition with livestock for available range feed; no direct damage to agriculture, but indirectly through trampling and bedding down.

Outdoor California
1950. [Antelope trapping and transplanting]. Vol. 11, no. 1, p. 1-2.
Program of transplanting fifty specimens from Lassen County lava bed plains to less crowded Benton Meadows, Mono County; effect of overgrazing, agricultural developments, special hunts; estimated population.

Springer, L. M.
1950. Aerial census of interstate antelope herds of California, Idaho, Nevada and Oregon. J. Wild. Man., vol. 14, no. 3, p. 295-298, 1 fig., 2 tbls.
Report on March 1949 cooperative inventory to answer problems of duplication of separate counts; methods and materials; habitat, distribution, concentrations, population estimates; notes that about 5000 of 13,879 observed individuals migrate across four state borders.

Ferrel, C. M. and H. R. Leach
1952. The prong-horn antelope of California with special reference to food habits. Calif. Fish and Game, vol. 38, no. 3, p. 285-293, 1 fig., 4 tbls.
Results of 83 stomach analysis taken from hunter kills and trap casualties to determine forage preference and seasonal food habits; early history, range and slaughtering; airplane census and 1951 estimate of 4536 animals; efforts to extend range, limited seasons; spring and fall diet, effect of weather; chemical analysis of sagebrush; antelope limitations, need for open range; concludes that sagebrush year-round staple; weather factor determining winter range extent and migration time; forbs high on list of summer range foods; no severe competition with livestock, little conflict with agriculture.

Stokes, J. D.
1952. Antelope management in California. West. Assoc. State Game and Fish Comm., 32nd Ann. Conf., Proc., p. 99-101.
Historical account of market hunting, closed season, herds and areas of population; air census methods and materials; food habits, predation, special hunts, trapping and transporting, competition from wild horses and burros; concludes that herd of 4000 can be maintained in northeastern California without undue conflict with agriculture.

Jones, F. L.
1954(?).Report on resurvey of proposed antelope planting sites. Calif. Dept. Fish and Game, Game Man. Br., 13 p. (Processed)
Description, location and history of areas; potentiality for antelope support; vegetation, springs, livestock, elevations.

Ackerly, W. F. and Vernon Regier
1955(?).California's 1955 antelope census. Calif. Dept. Fish and Game, Game Man. Br., 3 p., 1 fig. (Processed)
Methods and materials of aerial observations; census county by areas 1954 and 1955; notes overall 5.7% increase in northeastern area, but 12.0% decrease in Lassen County.

Ackerly, W. F. and Vernon Regier
1956(?).Northeastern California antelope studies. Calif. Dept. Fish and Game, Game Man. Br., 44 p., 3 figs., 10 tbls. (Processed)
Progress report of study inaugurated in 1953 to find a method of reversing downward trend of herd numbers; kidding season, tagging program, migration, herd composition, food habits, weather conditions, depredations, predation; annual census methods and materials; Tri-State Antelope Committee formation and function; concludes no significant overall effect of predators; sagebrush staple food with grass as important late-winter and early summer food; probable imaginary character of depredation reports; heavy winter 1951-1952 as single factor precipitating sudden Lassen County downfall; numbers continue on downward trend; Lassen County winter ranges badly over-grazed by domestic livestock; poor winter and summer range as big factor in static population; recommendations for further research and management.

DEER

California mule deer Odocoileus hemionus californicus
Columbian black-tailed deer Odocoileus hemionus columbianus
Inyo mule deer Odocoileus hemionus inyoensis

Clarke, F. C.
1913. Investigation of the large game situation in California with special reference to deer. *In* Calif. Fish and Game Comm., Game Bull. 1, p. 6-20.
Progress report of work initiated in 1911; parasites and diseases, species and varieties, habits, habitat, seasons and districts, relation to agriculture, predators.

Bryant, H. C.
1915. California's fur-bearing mammals. Calif. Fish and Game, vol. 1, no. 3, p. 96-107, 2 figs.
Review of historical works mentioning abundance, demand, early fur trade, fur farm development, with recommendations for meeting decrease in numbers.

Clarke, F. C.
1916. Malformed antlers of deer. Calif. Fish and Game, vol. 2, no. 2, p. 119-123, 4 figs.
External and internal stimuli affecting abnormalities—malnutrition, injury, castration.

Coffman, J. B.
1920. Notes on the life history of the black tailed deer. Calif. Fish and Game, vol. 6, no. 1, p. 15-16.
Condensation of report by Trinity National Forest Administration; migrations; feeding, rutting and nursing habits; antler and coat shedding.

McLean, D. D.
1925. The golden eagle as a deer enemy. Yosemite Nature Notes, vol. 4, no. 4, p. 27, 1 fig.
Observations of fawn predation.

Hall, E. R.
1927. The deer in California. Calif. Fish and Game, vol. 13, no. 4, p. 233-259, 11 figs.
Importance, distribution; key to subspecies and taxonomic description, habits, habitat, range; predators, disease.

McLean, D. D.
1928. What deer eat. Calif. Fish and Game, vol. 14, no. 3, p. 221-223.
Lists plants in diet and discusses feeding habits.

McLean, D. D.
1930. The burro-deer in California. Calif. Fish and Game, vol. 16, no. 2, p. 119-120.
A report of small population on southeastern desert region; habitat, food preferences.

Russell, C. P.
1932. Seasonal migration of mule deer. Ecol. Man., vol. 2, no. 1, p. 1-46, 5 figs.
Notes on Yosemite region population; winter and summer range and activity, rearing of young, food habits, fall migration, movement details, breeding.
Note: see especially p. 17-33.

Dixon, J. S.
1934a. A study of the life history and food habits of mule deer in California. Calif. Fish and Game, vol. 20, no. 3, p. 182-282, 65 figs.
First installment of two-part study, this portion devoted to life history facts; distribution, characteristics, breeding habits, natural enemies, diseases; importance to state; winter range, seasonal migrations, fluctuations in populations, habitat.
See Dixon (1934b).

Dixon, J. S.
1934b. A study of the life history and food habits of mule deer in California. Calif. Fish and Game, vol. 20, no. 4, p. 316-354, 5 tbls.
Conclusion of two-part study, this portion devoted to food habits; methods, availability of various foods, seasonal variations in habits, competition with livestock, depredations; list of foods eaten.

Moffitt, James
1934. Mule deer study program. Calif. Fish and Game, vol. 20, no. 1, p. 52-66, 1 fig.
Condition of herd, population estimate; proposals for different areas.

Cowan, I. McT.
1936. Distribution and variation in deer (*Genus odocoileus*) of the Pacific coastal regions of north America. Calif. Fish and Game, vol. 22, no. 3, p. 155-246, 13 figs., 8 tbls.
Examination of published material in order to present unified picture of species west of Rockies; variations in genus, pelage and molt, tails, glands, antlers, definition of measurements; synonymy, diagnosis and systematic account; bibliography, p. 240-246.

Robinson, C. S.
1936(?). A study of plants eaten by deer on the Santa Barbara National Forest. U. S. For. Serv., 8 p. (Processed) (Available at Calif. Dept. Fish and Game Library, Sacramento, Calif.)
Description of range, listing of food items, utilization, results of burning.

Orr, R. T.
1937. Notes on the deer of the California Redwood State Park. Calif. Fish and Game, vol. 23, no. 4, p. 286-290, 2 figs.
Condition and number of herd, food preference, behavior, denuding of vegetation.

McLean, D. D.
1938. Deer in the Sierra. *Calif. Conservationist*, vol. 3, no. 4, p. 18.
Location and condition of herds, population estimates, migration, range conditions, predation by coyotes, areas of over-population, salt and hay distribution; concludes that salt distribution and winter hay feeding unsatisfactory.

Johnson, F. W.
1939. Deer kill records—a guide to management of deer hunting. Calif. Fish and Game, vol. 25, no. 2, p. 96-165, 28 figs., 29 tbls.
Quality of crop, methods of harvest, providing adequate forage supply; distribution of hunters; correlation with fishery catch records relative to excessive exploitation; type of record, forest area; condition of herds, quality and size relationship with hunting effort, effect of season length, use of antler beam diameter measurement; recommendations for management.

Randle, A. C.
1939. Summary report of the winter mule deer range studies made during the winter of 1938-1939. U. S. For. Serv., 11 p. (Processed) (Available at Calif. Dept. Fish and Game Library, Sacramento, Calif.)
Interstate Deer Herd preliminary report; population counts, range and herd condition, losses, rutting, antlers; concludes existence of four definite migration or drift lanes; slow drift for 100 or more miles from north and south limits of yearlong range; late January heaviest state line movement; serious overgraze of range; no improvement without drastic herd reduction; recommends antlerless hunt; special late season on migration areas.

McLean, D. D.
1940. The deer of California, with particular reference to the Rocky Mountain mule deer. Calif. Fish and Game, vol. 26, no. 2, p. 139-166, 14 figs.
Characteristics of genus, distribution in North and South America and California, migration, life history, breeding habits, food habits, predators, diseases.

Cronemiller, F. P.
1943. Deer refuges under the buck law. Calif. Fish and Game, vol. 29, no. 4, p. 180-190, 6 figs., 1 tbl.
Results of study to determine effectiveness of refuges as tool in management; kills per area; habits, habitat; concludes that refuges of value for visual recreation, as needed protection on defined migration routes, and in burned-off areas; but that refuges reduce take proportionately to area covered.

Fischer, G. A. and others
1944. The winter range of the Interstate Deer Herd, Modoc National Forest, California. U. S. For. Serv., 20 p., 7 figs., 1 tbl. (Processed) (Available at Calif. Dept. Fish and Game Library, Sacramento, Calif.)
Topography, cover types, climate and weather of study area; deer and livestock populations 1913-1943, general area occupied, migration and drift routes, seasonal concentrations and distribution, condition and utilization of forage, grazing capacity; herd composition, condition, losses, antler shedding, feeding and breeding habits, water influences; notes herd increase, light predator loss, elimination of key forage species, increased vulnerability to severe winters.

Dixon, J. S. and C. M. Herman
1945. Studies on the condition of California mule deer at Sequoia National Park. Calif. Fish and Game, vol. 31, no. 1, p. 3-11, 7 figs.
Results of field observations to determine over utilization of browse; parasites, disease, autopsy examination.

Herman, C. M.
1945. Some worm parasites of deer in California. Calif. Fish and Game, vol. 31, no. 4, p. 201-208, 2 figs.
Description of parasites.

Ashley, J. F.
1946. Deer winter range problems in California. West. Assoc. State Game and Fish Comm., 26th Ann. Conf., Proc., p. 83-88, 2 figs.
Historical changes in winter range; effect of agricultural development and artificial feeding; condition and abundance of browse species, refuges.

Herman, C. M.
1946. The nose bot fly of deer. Calif. Fish and Game, vol. 32, no. 1, p. 17-19, 2 figs.
Symptoms of maggot stage; notes lack of information.

Herman, C. M. and A. I. Bischoff
1946. The foot worm parasite of deer. Calif. Fish and Game, vol. 32, no. 4, p. 182-190, 4 tbls.
History of filariid worm, methods of study; incidence and geographic distribution, number, size, sex ratios, location, pathology and pathogenicity; notes no visible evidence of harmful effect to deer; notes occurrence only on feet.

Herman, C. M.
1947. Further observations on deer foot worm infection. Calif. Fish and Game, vol. 33, no. 1, p. 54.
Notes Humboldt County kill of individual heavily infected over entire body.

Interstate Deer Herd Committee
1947. Second progress report on the cooperative study of the interstate deer herd and its range. Calif. Fish and Game, vol. 33, no. 4, p. 287-314, 11 figs., 21 tbls.
Compilation of several individual reports of field workers; range, livestock numbers, climate and weather, migrations, censuses, herd size and classification, bitterbrush and grass utilization studies; food habits, pregnancy, survival, parasites; wild horse and trespass livestock problems.

McKean, J. W.
1947. Interstate Deer Herd study. West. Assoc. State Game and Fish Comm., 27th Ann. Conf., Proc., p. 110-115.
Summarization of Oregon cooperative program; history of problem, National Forests studies; population trends, migrations, herd composition, forage utilization, stomach analysis, disease, productivity; concludes over 13,000 total winter population; bitterbrush continuously over-utilized by 20-30%; bitterbrush not essential to herd maintenance.

Chattin, J. E.
1948. Breeding season and productivity in the interstate deer herd. Calif. Fish and Game, vol. 34, no. 1, p. 25-31, 3 figs., 7 tbls.
Census figures; breeding dates, age and potential; embryo sex ratio.

Dasmann, W. P.

1948. A critical review of range survey methods and their application to deer range management. Calif. Fish and Game, vol. 34, no. 4, p. 189-207, 5 tbls.

Review of literature; deer as crop indirect product of soil and direct product of palatable vegetation; out-balancing, carrying capacity.

Leopold, A. S., Randal McCain and W. M. Longhurst

1948. Preliminary report on the problems of deer management in California. Report to Calif. Fish and Game Comm., 16 p., 1 fig. (Processed) (Available at Calif. Dept. Fish nad Game Library, Sacramento, Calif.)

Increase of population, utilization in other states, starvation, diseases and parasites, predation, lowered fawn survival, carrying capacity, livestock competition, habitat management, refuges, agricultural damage, management recommendations.

See Leopold and others (1951) and Longhurst, Leopold and Dasmann (1952) for completed studies.

Longhurst, W. M.

1948. Some management problems of deer in California. West. Assoc. State Game and Fish Comm., 28th Ann. Conf., Proc., p. 174-175.

Importance of species to hunter, hunting pressure, protective measures, adequate cropping requirements.

Cook, B. B. and others

1949. The influence of seasonal and other factors on the acceptability and food value of the meat of two subspecies of California deer and of antelope. *Hilgardia*, vol. 19, no. 8, p. 265-284, 8 figs., 6 tbls.

Results of study to provide basis for determining proper hunting season; palatability tests; methods for vitamin, fat, moisture and protein analyses; test results and recommendations.

Interstate Deer Herd Committee

1949a. Interstate winter deer range management plan. Calif. Fish and Game, vol. 35, no. 2, p. 103-114, 4 figs., 9 tbls.

Presentation of revised plan for management of winter range; history of area, early game use and management, chronological history of California and Oregon laws, forage species, composition of herd.

Interstate Deer Herd Committee

1949b. Third progress report on the cooperative study of the interstate deer herd and its range. Calif. Fish and Game, vol. 35, no. 2, p. 115-134, 5 figs., 14 tbls.

Car strip census, state line track count, pellet group count, forage utilization check, deer trapping.

Cronemiller, F. P. and P. S. Bartholomew

1950. The California mule deer in chaparral forests. Calif. Fish and Game, vol. 36, no. 4, p. 343-365, 7 figs., 8 tbls., appendix.

Results of three-year study in Angeles National Forest; range, intergradation with Columbian black-tailed and southern mule deer populations, winter and summer range; description of forest and study area; climate, cover, fire, water, fauna; herd population estimate, size and sex classification, breeding, movements, mortality; hunting effort and success, refuge establishment; concludes that population in chaparral forests of Southern California markedly smaller than same specie of higher, more humid Sierra Nevada forests; health prime factor controlling herd size; refuge reduced opportunity for successful hunting; refuge not management tool under any form of harvesting.

Dasmann, W. F.

1950. A case against waste. *Donner Trail Reporter*, vol. 1, no. 14, p. 1, 12-13, 7 figs.

Historical population estimates, range conditions, migrations, agricultural depredations, death from disease and malnutrition, carrying capacity, surplus populations.

Ferrel, C. M. and H. R. Leach
1950. Food habits of a California deer herd. Calif. Fish and Game, vol. 36, no. 3, p. 235-240, 2 figs., 2 tbls.
Results of forty stomach samples of Jawbone herd occupying winter range along west slope of Sierra Nevada in Tuolumne County; seasonal altitudinal migrations, highly restricted winter range, numbers exceed carrying capacity; list principal foods on summer and winter range; concludes that on winter range 89% total volume browse species, mountain misery single most important item, manzanita second.

Hagen, H. L.
1950. Nutritive value for deer of some forage plants in the Sierra Nevada. Univ. Calif., MA thesis, 31 p., 5 figs., 13 tbls. (Typewritten)
Description of Jawbone Ridge study area, vegetation, cover; stomach content analyses, chemical analysis of food, digestion trial, seasonal variation of protein; notes average nutritive value decreases through winter; deer have no more trouble digesting browse species than do cattle with ordinary hay.

Herman, C. M. and A. I. Bischoff
1950. Papilloma, skin tumors in deer. Calif. Fish and Game, vol. 36, no. 1, p. 19-20, 1 fig.
Size, occurrence, nature of tumor; effect on animals.

Interstate Deer Herd Committee
1950. Fourth progress report on the cooperative study of the Interstate Deer Herd and its range. Calif. Fish and Game, vol. 36, no. 1, p. 27-52, 4 figs., 27 tbls.
Results of two counts of Interstate and Glass Mountain herds for census and classification; composition of population, census methods, forage studies, deer-livestock cropping; concludes heavy numerical increase because of heavy snow pushing deer and heavy fawn survival.

Leopold, A. S.
1950. Deer in relation to plant nutrition. 15th No. Amer. Wildl. Conf., Trans., p. 571-580.
Historical changes in populations, maximum densities, overpopulations, vegetation, purposeful control of plant succession, effect of deer on range.

McLean, D. D.
1950. The deer of California. *Donner Trail Reporter*, vol. 1, no. 12, p. 1, 6-8, 5 figs.
Origin and character of North American genus and species, distribution, migration, habitat, rutting, gestation, food habis, predation, disease, antlers and pelage.

Sayama, Kenji
1950. *Sarcocystis* in deer, antelope and elk of California. Univ. Calif., MA thesis, 78 p., 4 figs., 4 tbls., 1 map. (Typewritten)
History and nature of problem, morphological description, distribution within muscle and according to age, incidence and geographic distribution, pathogenicity.
Note: condensation appears in Calif. Fish and Game, vol. 38, no. 1, p. 99-104.

Biehn, E. R.
1951. Crop damage by wildlife in California, with special emphasis on deer and waterfowl. Calif. Dept. Fish and Game, Game Bull. 5, p. 9-43, 19 figs., 1 tbl.
History of depredation, increase in size and scope; nature of damage to orchards, truck farms, vineyards, forage and cereal crops, private gardens and nurseries; deer-livestock competition, damage trends and extent, effect of less water and increased population, distribution, control methods; concludes main causes of damage as decrease of natural habitat, increase of agricultural practices, water shortage on deer ranges, population increase; recommends antlerless hunts in excessive populations as most practical and efficient solution.
Note: adapted from MA thesis, Coll. of Pacific.

Bissell, H. D.
1951. Nutritive value of winter deer browse with respect to burning and growth stage. Univ. Calif., MA thesis, 31 p., 11 figs., 8 tbls. (Typewritten)
Results of investigation of qualitative nutrition in chamise brush of north coast range in California; description of Lake County study area; population in relation to chaparral growth stage, stomach analyses, chemical composition of principal browse species; concludes that late winter differences between burned and unburned brush not consistently great enough to account for known population differences; either amount of herbaceous growth available or some late summer nutritional aspect constitutes critical factor.

Cronemiller, F. P.
1951. Some dynamics of a mule deer population. J. Wild. Man., vol. 15, no. 2, p. 206-208, 3 tbls.
Census of Interstate Deer Herd 1944-1947; reproduction and computed losses, changes in male and female populations; concludes high breeding potential; hunters harvest very small fraction of potential.

Dasmann, R. F.
1951. A study of deer population density in California. Univ. Calif., MA thesis, 52 p., 5 figs., 9 tbls. (Typewritten)
Partial results of study reported in Longhurst, Leopold and Dasmann (1952); important factors influencing density levels.

Dasmann, W. P.
1951. Some deer range survey methods. Calif. Fish and Game, vol. 37, no. 1, p. 43-52, 6 figs.
Devoted to methodology of range inventories.

Interstate Deer Herd Committee
1951. The Devils Garden deer herd. Calif. Fish and Game, vol. 37, no. 3, p. 233-272, 15 figs., 14 tbls.
Description and history of area; size of herd, methods of count and estimates, production and survival, food; vegetation, cover, browse, forage utilization, livestock, reduction program and range improvement.

Leopold, A. S. and others
1951. The Jawbone deer herd. Calif. Div. Fish and Game, Game Bull. 4, 139 p., 66 figs., 21 tbls.
Results of one segment of study reported in Longhurst, Leopold and Dasmann (1952); history of population and range in Tuolumne County area, population trends, 1924-1926 hoof and mouth disease slaughter, trapping and transplanting, range description; study methods and materials; weights, measurements, growth curves, general health, pathological condition, parasites; summer range density, relation with Rocky Mountain mule deer and cattle, food habits, fawning predation, sex segregation, home range and dispersal, molt; winter food habits, rut, antler shedding, movement, influence of snow, losses; migrations, routes and habits; hunting distribution, quality and effect; population composition and fluctuations, productivity; concludes 5570 population estimated in 304 square mile range; November downward migration to concentration in 37 square mile area; May upward drift; four migration routes determined largely by topography; each individual deer has distinct fixed winter and summer home range; fawns dropped in mid-July in wet meadows or moist, well vegetated sites; predation by bear and coyote not limiting factor; protein intake probable determining factor in winter survival with critical point about seven to eight percent; 32% annual production; hunting removal stimulates higher fawn production; hunting removes seven to eight percent population, balance of 32% production lost to starvation; recommends hunting instead of starvation as population control; October 1st-31st buck season; antlerless harvest; moderation of intensive predator control program; periodic opening up of timber stands by commercial logging; rigid fire control; elimination of stock grazing competition; no artificial feeding or salting.

Riney, T. A.
1951. Home range and seasonal movement in a sierra deer herd. Univ. Calif., MA thesis, 42 p., 12 figs., 1 tbl. (Typewritten)

Results of limited investigation as part of Jawbone herd study; trapping and tagging methods and materials; yearly range, main migration routes, downward fall migration, upward spring drift, size and shape of individual deer home range; influence of food, rut, snow, range conditions, hunting; homing; concludes that home range one-half mile in diameter for bucks and under one-quarter mile for does and fawns; rutting does not modify home range size; snow depth and herd condition most important factors in range size; homing operative to some extent.

Taber, R. D.
1951. The influence of chaparral management on Columbian black-tailed deer populations. Univ. Calif., Ph. D. thesis, 126 p., 10 figs., 29 tbls. (Typewritten)

Geology, soils, climate, altitude, slope, exposure, vegetation, herbaceous density and woody cover of study area; seasonal population densities, conception rate, survivals, movement, nutrition, food habits, disease and parasites, predation; concludes relatively stable population density in opened-up and full density brush and highly unstable in wildfire burn; conception rate very closely related to ovulation rate; winter movement downward toward woodland-grass and back in spring; irregular but free movement to new foods; difference in deer size and condition evidence of different nutritional planes; parasitism not survival factor in normal year.

Bissell, H. D.
1952. Nutritional studies on California big game. West. Assoc. State Game and Fish Comm., 32nd Ann. Conf., Proc., p. 178-184.

Factors contributing to losses, previous research, browse species and utilization, stomach content analysis, nutrition experiments, quantity and quality requirements; notes that nutrition of rumen organisms limiting factor; palatability not necessarily correlated with high protein content.

Biswell, H. H. and others
1952. Management of chamise brushlands for game in the north coast region of California. Calif. Fish and Game, vol. 38, no. 4, p. 453-484, 19 figs., 4 tbls.; especially p. 460-463.

Progress report of 1948-1951 investigation mainly in Lake County to determine whether game populations build up under brushland management and most satisfactory way to manipulate cover to increase production; description of areas, vegetation, soils, climate, land management pattern; burning, grazing, control of sprouts, mechanical and chemical control of brush, reseeding; resident nature of population, fawn production, relative condition of individuals; food habits, nutrition.

Bryan, H. F. and W. I. Long
1952. Results of the 1950 special deer hunt on Mineral King National Game Refuge. Calif. Fish and Game, vol. 38, no. 2, p. 235-238, 4 tbls.

Data from controlled hunt opened in effort to relieve pressure on range and remove chronic camp-dwelling deer; history and description of area in Sequoia National Park; spring migration, unique overpopulation of summer range; hunter success.

Dasmann, R. F.
1952. Methods for estimating deer populations from kill data. Calif. Fish and Game, vol. 38, no. 2, p. 225-233, 1 fig., 2 tbls.

Analysis of problems, presentation of conclusion on relative utility of various methods; sex and ratio combinations, sources of error, rough methods; concludes that sources of error tend to induce underestimation of population size.

Lassen, R. W., C. M. Ferrel and H. R. Leach
1952. Food habits, productivity and condition of the Doyle mule deer herd. Calif. Fish and Game, vol. 38, no. 2, p. 211-224, 9 figs., 8 tbls.

Data from 213 salvageable carcasses from Lassen-Washoe herd; range composition and past use; browses, forbs, grass; herd composition and

age counts, pregnancy data; concludes that quality and quantity of available food not good; sagebrush principal browse; bitterbrush second, but overcropped and depleted; important alfalfa depredation; poor survival of fawns and yearlings.

Longhurst, W. M., A. S. Leopold and R. F. Dasmann

1952. A survey of California deer herds, their ranges and management problems. Calif. Dept. Fish and Game, Game Bull. 6, 136 p., 38 figs., 23 tbls.

Results of cooperative field work 1948-50 on all state ranges and parts of Oregon and Nevada; survey methods and materials; herd composition counts, original populations, effect of unregulated hunting, livestock competition, changes in natural vegetation, legal protection, management procedures; population numbers and density, location of herds and ranges, migration, browse species, range problems; reproductive gains, hunting, malnutrition, qualitative nutrition, diseases and parasites, predation; buck hunting regulations, doe harvest, cooperative hunting, game refuges, agricultural damage, habitat improvement, deer-livestock competition; concludes that 1,126,000 breeding population nets perhaps 250,000 annual crop; hunters bag 75,000 of crop; starvation and disease take toll after range and crop damage; no material benefit from predator control program; recommends liberalization of regulations to permit two to three times kill; doe harvest.

Note: appendices contain diseases and parasites, range units, principal browse species, range condition summaries.

See Leopold and others (1951) for one segment of study.

Biswell, H. H., A. M. Schultz and D. W. Hedrick

1953. A possible method of increasing western mountain mahogany on game ranges. Calif. Fish and Game, vol. 39, no. 2, p. 187-189, 1 fig.

Observation and brief measurements in Madera County foothills on one of main deer browse species; recommends controlled fire in some instances.

Blaisdell, J. A.

1953. A progress report on the Doyle deer herd. West. Assoc. State Game and Fish Comm., 33rd Ann. Conf., Proc., p. 132-139, 1 fig., 5 tbls.

Description of range and herds, population estimate, range composition, stomach analyses, breeding age, fawn survival, sex ratio; forage utilization, availability, nutrition; salt block and fencing experiments; concludes that most deer in herd breed first at thirty months; artificial reseeding of bitterbrush mandatory; recommends antlerless hunts in California and Nevada; keeping herd at estimated 12,000; harvest of 2500 annual increment.

Dasmann, R. F.

1953. Factors influencing movement of non-migratory deer. West. Assoc. State Game and Fish Comm., 33rd Ann. Conf., Proc., p. 112-116, 1 tbl.

Continuation of work in Lake County; trapping and marking methods and materials; home range and movement beyond, rutting season and dispersal travels, wandering; effects of weather, food, disturbance, injury, population density; concludes normal conservative character of movement habits, with deer usually remaining in one-half mile diameter area.

Hagen, H. L.

1953. Nutritive value for deer of some forage plants in the Sierra Nevada. Calif. Fish and Game, vol. 39, no. 2, p. 163-175, 7 tbls.

Report of Jawbone Ridge herd study in central Tuolumne County; summary of previous investigations, feeding experiments, chemical analysis of forage plants; study area range samples, chemical analysis, digestion trial; emphasizes limited nature of test; concludes that crude protein count most significant contract between "good" and "poor" forage plants.

Note: adapted from MA thesis, Univ. Calif., 1949.

Jones, F. L.

1953. Aging the Inyo Mule Deer. West. Assoc. State Game and Fish Comm., 33rd Ann. Conf., Proc., p. 209-219, 2 tbls.

Progress report based on 456 jawbones to develop growth and replacement schedules and criteria of wear; specimens used, age classes, number of uppers and lowers, aging schedules for live and cleaned jaws, criteria

of wear descriptions; notes that other studies indicate variations among individuals and populations in tooth growth and wear; value in local aging studies.

Laughlin, John

1953. Report on Southern California's January deer season. Calif. Fish and Game, vol. 39, no. 4, p. 507-515, 1 fig.

Description of area, reasons for regular season closure, plans for removing pressure and overcoming problems; game refuge system, county ordinances, management of hunt; kill statistics; general favorable hunter comment.

Leopold, A. S.

1953. Too many deer. Sierra Club Bull., vol. 38, no. 8, p. 51-57.

Evidence for and against antlerless hunts; Kaibab, Pennsylvania, Idaho, Minnesota and other experiences; control methods, population dynamics, habitat, protection, predation, reeducation of public regarding doe hunts.

Linsdale, J. M. and P. Q. Tomich

1953. A herd of mule deer. Univ. Calif. Press, 567 p., 174 figs., 18 tbls.

Record of observations made on Hastings Natural History Reservation; description of range and species; structure, communication, mannerisms, habitat, habits, food, reproduction, population.

Longhurst, W. M. and J. R. Douglas

1953. Parasite interrelationship of domestic sheep and Columbian black-tailed deer. 18th No. Amer. Wildl. Conf., Trans., p. 168-188, 6 tbls.

University of California Hopland Field Station study 1951-53; description of area, study methods and materials; nutrition and losses, digestive tract measurements, weather relationship, effects on fawns, parasites list, experimental transfers, flukes, tapeworms, protozoa, ectoparasites; foraging habits, chemical control, stocking rates; concludes that parasites contribute to heavy deer loss; effects of malnutrition intensify parasitism; deer reduction reduced parasitism; chemical control not practical on deer.

Schultz, A. M.

1953. Reseeding managed chaparral brush areas for deer. West. Assoc. State Game and Fish Comm., 33rd Ann. Conf., Proc., p. 260-264, 1 tbl.

Report of cooperative studies by University of California and State Department in north coastal and central sierra foothill regions; cover to prevent soil erosion, forage for game and livestock, control of brush seedlings, problems of obtaining stands.

Note: see J. Range Man., vol. 5, no. 5, p. 338-345, Schultz and Biswell (1952) and vol. 6, no. 3, p. 172-180, Biswell and others (1953) for other reseeding studies.

Taber, R. D.

1953a. Production, mortality and yield of black-tailed deer on chaparral range. West. Assoc. State Game and Fish Comm., 33rd Ann. Conf., Proc., p. 128-131, 2 tbls.

Results of study assessing effects of brush management in Lake County; herd composition counts, carcass tallies, harvest and reproduction studies.

Taber, R. D.

1953b. The secondary sex ratio in *Odocoileus*. J. Wild. Man., vol. 17, no. 1, p. 95-97, 2 tbls.

Taxonomical grouping of records, ratio tendencies, prenatal mortality; approximates ratio of 120 males to 100 females.

Taber, R. D.

1953c. Studies of black-tailed deer reproduction on three chaparral cover types. Calif. Fish and Game, vol. 39, no. 2, p. 177-186, 5 figs., 4 tbls.

Report on collection of does in Lake County, February-August 1950; description of areas; age at first breeding, prenatal fawn mortality, average fawn production by does of each age class, breeding dates; concludes peak of conception last week October and first two weeks November.

Note: see Taber (1951) for complete study.

Dasmann, R. F.

1954. Ecology and social behavior of a population of the Columbian black-tailed deer in California. Univ. Calif., Ph. D. thesis, 155 p., 17 figs., 20 tbls. (Typewritten)

Physiography, weather, vegetation and land use of Lake County study area; weight, antlers, pelage, age characters, population density, sex and age ratios, natality, mortality, annual cycles of activity, mobility, social aggregation, reproduction; effect of weather, vegetation, cover, water and man; concludes high population density resulting in overuse of preferred forage plants, combined with seasonal decline in protein quality of staples caused excessive 44% mortality 1951-1952; non-migratory character of population with home range diameter between 800 and 1400 yards; aggressive behavior density-dependent; recommends continuous controlled chaparral burning with reseeding to herbaceous cover.

Note: see Dasmann and Taber (1956) for adaptation.

Dasmann, W. P. and J. A. Blaisdell

1954. Deer and forage relationship on the Lassen-Washoe interstate winter deer range. Calif. Fish and Game, vol. 40, no. 3, p. 215-234, 5 figs., 13 tbls.

Report of one phase of four year range study concerned with relationship of deer production and survival with various range factors; methods, utilization surveys, pellet counts, herd composition, ground cover inventory, fawn production and survival; effect of livestock forage; concludes that strong correlation between fawn survival and percentage utilization of bitterbrush leader growth; effect of livestock use remained constant; considerable year to year variation of bitterbrush forage volume by deer.

Griffith, W. H., Jr.

1954. An inner coast deer study. Calif. Dept. Fish and Game, [Deer Studies], no. 2, 17 p., 12 figs., 16 tbls. (Processed)

Results of San Benito County study; area description and history, livestock use, range surveys, ground cover composition, age classes, forage utilization, annual browse leader growth, enclosures, habitat improvement; food habits, population trends, counts, production and survival, annual yield, trapping and tagging, disease, depredation, predation, management recommendations.

Interstate Deer Herd Committee

1954. Eighth progress report on the cooperative study of the Devils Garden interstate deer herd and its range. Calif. Fish and Game, vol. 40, no. 3, p. 235-266, 4 figs., 33 tbls.

Organization, outline of Committee work; fire history of area; track and pellet counts, herd composition, winter mortality, stomach content analyses, predation; forage inventory and utilization, ground cover, salting study, browse restoration study, livestock on range; concludes that state line track count most reliable method for obtaining numbers; pellet count as indicator of relative use on key area; calculated 32% winter loss, 1951-52; consistent low percentage of males; downward trend in range conditions, due primarily to fire; 1951-52, 1952-53 population close to proper numbers for proper range maintenance.

Taber, R. D. and R. F. Dasmann

1954. A sex difference in mortality in young Columbian black-tailed deer. J. Wild. Man., vol. 18, no. 3, p. 309-315, 2 tbls.

Results of Lake County study; description of area, climate, rainfall, vegetation; aging of carcasses, antler development, herd composition, sex ratio, food-economy; concludes that in deer under eighteen months more males die than females; most mortality connected with starvation.

Bissell, H. D. and others

1955. The digestibility of certain natural and artificial foods eaten by deer in California. Calif. Fish and Game, vol. 41, no. 1, p. 57-78, 2 figs., 23 tbls.

Preliminary report on nutritive values of various feeds; account of previous experiments; methods and construction of digestion trial cages, chemical analyses of food and feces, caloric intake; concludes limited value of single item diets; no craving for salt, recommends management of herd environment to maintain variety of palatable browse species.

Bissell, H. D. and Helen Strong
1955. The crude protein variations in the browse diet of California deer. Calif. Fish and Game, vol. 41, no. 2, p. 145-155, 4 tbls.
Report of potential protein content of year-round diet; methods, listing and analysis of browse species.

Dasmann, R. F. and R. D. Taber
1955. A comparison of four deer census methods. Calif. Fish and Game, vol. 41, no. 3, p. 225-228, 2 tbls.
Description of area west of Lakeport, Lake County; total deer, sample-area, Lincoln index and pellet-group counts; concludes that sample-area count most useful method in study area.

Dwyer, E. V.
1955. Ultimate water requirements in the Feather River drainage basin for fish and game. *In* Northeastern counties investigations: report on Upper Feather River Service area. Calif. Div. Water Resources, Appendix D, 42 p., 7 tbls., 1 pl.
Development of hunting and fishing, description of stream sections, effects of major developments, improvement projects, hunting pressure and value; migration routes, effects of concentration on survival rate and population size.

Hightower, A. A. and J. L. Hiehle
1955. Three Siskiyou County deer herds. Calif. Dept. Fish and Game, [Deer Studies], no. 3, 66 p., 15 figs., 22 tbls. (Processed)
Results of three-year study of Oak Knoll, Hartstrand Gulch and Miller Mountain herds; description and history of areas, vegetation, livestock grazing, fire, logging, range and forage surveys, pellet counts, permanent forage plots, stomach content analysis, herd composition, die-offs, trapping, harvest, depredation: management recommendations for each area.

Jones, F. L.
1955. The Inyo-Sierra deer herds; a final area report. Calif. Dept. Fish and Game, [Deer Studies], no. 5, 84 p., 8 figs., 45 tbls. (Processed)
Results of 1951-1953 Inyo mule deer study; description and location of Owens Valley and Buttermilk, Goodale and Tunawee study areas; deer populations, livestock, winter snows, range inventory, ground cover, browse utilization, hunting season, migration, production and mortality, sex and age ratios, predation, disease and parasites, food habits, antlers and pelage, management recommendations; concludes that populations increased steadily to 1946 and then marked reduction occurred; reseeding with preferred browse species desirable; significant portion of summer fawn loss probably due to predation.

Lassen-Washoe Deer Herd Committee
1955. Lassen-Washoe Deer Herd management plan. Calif. Dept. Fish and Game, [Deer Studies], no. 4, 25 p., 7 figs., 14 tbls. (Processed)
Location and description of range, history of area, livestock and deer use, winter and summer areas, forage utilization, stomach analyses, pellet counts, reproduction herd composition, disease and parasites, mortality, harvest, range improvement, antlerless hunts; objectives, policies and management plan.

Longhurst, W. M.
1955. The role of parasites in the population dynamics of a herd of black-tailed deer. West. Assoc. State Game and Fish Comm., 35th Ann. Conf., Proc., p. 145-154, 6 tbls.
Results of 1951-1955 study at Hopland Field Station, University of California; description of area, climate, precipitation, temperature; herd movement, composition, loss, productivity, sex ratio, seasonal diet shift; parasite habitat, period of infection; concludes that parasites can contribute significantly to fawn loss during first winter and to lesser extent to yearlings during second summer; few older deer carry sufficient numbers of worms to be infected; magnitude of losses involving parasitism can be increased by severe weather and overstocked condition.

Bischoff, A. I.
1956. The breeding season of some California deer herds. Calif. Fish and Game, vol. 43, no. 1, p. 91-96, 2 figs.
Brief account of previous extensive studies; general locale of study herds, materials and methods; collection of 427 embryos from twelve herds determining breeding dates for each herd.

Blong, Bonnar
1956. A south coast deer range. Calif. Dept. Fish and Game, [Deer Studies], no. 1, 27 p., 13 figs., 10 tbls. (Processed)
Results of 1951-1953 study in Santa Barbara County; area description, climate, water distribution, soils, settlement; deer and livestock history, forage utilization and composition, range trend; food habits, production, fawn survival, mortality, predation, tagging and movement studies, herd size and population trend, harvest, depredations, management recommendations.

Cowan, I. McT. and others
1956. The mule deer and black-tailed deer. *In* The deer of North America. Stackpole Co. and Wild. Man. Inst., p. 333-617, various figs. and tbls.
Type specimens, description, measurements, weights, distribution, habit, habitat, life history notes, management.

Dasmann, R. F.
1956. Fluctuations in a deer population in California chapparal. 21st No. Amer. Wildl. Conf., Trans., p. 487-499, 1 fig., 1 tbl.
Lake County study 1949-1955; history and description of area; census sex and age structure, mortality, movement, sequence of change in population, shrub growth, season and cause of loss, natality and fawn survival, density and carrying capacity; concludes that protein content of available forage explains die-off; density of shrubland population two or three times higher than population in dense, unmodified chaparral.

Dasmann, R. F. and R. D. Taber
1956a. Behavior of Columbian black-tailed deer with reference to population ecology. J. Mamm., vol. 37, no. 2, p. 143-164, 4 figs., 5 tbls.
Continuation of Lake County study; area description; annual activity cycle, hunting and rutting season behavior; family, buck and feeding groups; random aggregation, social structure significance, migration, home range, movements outside home range, wandering, dispersal, dominance, aggression, territoriality, behavior and density; concludes that population non-migratory; could not be driven from home range.
See Dasmann (1954).

Dasmann, R. F. and R. D. Taber
1956b. Determining structure in Columbian black-tailed deer populations. J. Wild. Man., vol. 20, no. 1, p. 78-83, 2 tbls.
Comparison of various methods; five-category herd composition counts, criteria for separating age and sex classes; effect of seasons, weather and time of day on counts; observation techniques.

Hodson, E. E.
1956. Two Yolla Bolly unit deer herds. Calif. Dept. Fish and Game, [Deer Studies], no. 4a, 55 p., 17 figs., 38 tbls. (Processed)
Results of 1952-1955 study of migratory sub-unit of Columbian black-tailed deer between southwest boundary of Colusa County and Redding; description of Elephant Hill and Lake Hollow study areas; vegetation, fire history, logging, livestock grazing; forage surveys, pellet group counts, food habits, fertilization rate, breeding and fawning, summer and winter mortality; herd composition, size, yield; weights and measurements, migration, local movement, predation, diseases and parasites; recommends herd maintenance at approximately 1,600; either-sex hunting; habitat improvement.

Leach, H. R.
1956. Food habits of the Great Basin deer herds of California. Calif. Fish and Game, vol. 42, no. 4, p. 243-308, 36 figs., 16 tbls.
Results of 978 stomach analyses on monthly and yearly increments from Devils Garden, Lassen-Washoe, Verdi and Inyo herds; composition of herds, description of areas, vegetable composition of range, migration,

food habits, effect of climatic conditions; concludes that bulk of winter foods consists of sagebrush, bitterbrush, juniper, annual grasses; winter mortality related directly to severity and duration of weather.

Taber, R. D.

1956a. Characteristics of the pelvic girdle in relation to sex in black-tailed and white-tailed deer. Calif. Fish and Game, vol. 42, no. 1, p. 15-21, 4 figs., 1 tbl.

Description and illustration of differences to assist in sexing headless or butchered specimens; sex indicators, age factors.

Taber, R. D.

1956b. Deer nutrition and population dynamics in the North Coast Range of California. 21st No. Amer. Wildl. Conf., Trans., p. 159-172, 3 figs., 4 tbls.

Description of Lake County study area methods and materials of measurements; available forage, annual diet, nutrition plane, population density, potential yield; concludes that difference between populations due principally to differences in quantity and quality of available forage.

Leach, H. R. and J. L. Hiehle

1957. Food habits of the Tehama deer herd. Calif. Fish and Game, vol. 43, no. 3, p. 161-178, 8 figs., 5 tbls.

Stomach analyses of 133 Columbian black-tailed specimens (*O. h. columbianus* Richardson) prompted by livestock interests' concern over herd increase and possible range competition; description and location of herd in Red Bluff-Lake Almanor-Lassen Park area; description of winter and summer range; vegetation composition, climate, food items list; concludes that browse staple winter diet item; leafage and acorns of deciduous oaks early fall heavy contributors; later fall heavy utilization of annual grasses and forbs.

Bischoff, A. I.

1958. Productivity in some California deer herds. Calif. Fish and Game, vol. 44, no. 3, p. 253-259, 4 tbls.

Results of reproductive material studies from 322 adult does, 31 yearlings and 20 female fawns from eleven herds representing five subspecies; sampling methods and materials; percent pregnant, ovulation, fertilization; embryos per pregnant doe, abortion; notes variation in productivity; low occurrence of fetal abnormalities except for Camp Pendleton herd.

Dasmann, W. P. and H. A. Hjersman

1958. Deer survival and range forage trends on eastern California winter ranges. Calif. Fish and Game, vol. 44, no. 1, p. 51-72, 1 fig., 14 tbls.

Location and description of study areas; precipitation, fawn survival and range records, growth indices, bitterbrush utilization, overbrowsing, pellet counts; concludes similarity in year-to-year trends in fawn survival, leader growth of bitterbrush, percentage of overbrowsing and degree of deer pressure on winter concentration areas.

Dasmann, W. P., H. A. Hjersman and Daly Gilsenan

1958. California's first general either-sex deer hunting season. Calif. Fish and Game, vol. 44, no. 3, p. 23-251, 1 fig., 11 tbls.

Brief history of events leading up to 1956 season, breakdown of kill by region, problems; early and late season reported kill composition, fawns, hunter distribution, crippling loss, landowner cooperation, public reaction; concludes 38,051 antlerless harvest; that full impact not to be felt until 1958 and 1959 seasons; hunter distribution produces serious safety problems in some areas; general either-sex seasons good management tools, especially in Coast Range agricultural areas.

Dasmann, W. P. and Fred Jones

1958. The '57 deer season—final report. *Outdoor California*, vol. 19, no. 5, p. 4-5, 8 tbls.

Analysis of either-sex hunts, prospects for year following; history of regular season buck kills 1948-1957, leading counties' averages, abundance and survival of fawn crop, effect of early storms and forked-horn law, tag returns; concludes that herds not decimated; 1956 fawn crop abundant and survived well; spike yearlings not wiped out in either-sex hunts.

Hjersman, H. A. and others
1958. The San Joaquin deer herd and range. Calif. Dept. Fish and Game, Game Management Br., 63 p., 16 figs., 33 tbls., appendices. (Processed)
General description of area, physical structure of range, geology; effect of man, livestock grazing and logging; age composition of vegetation, form classes, forage utilization, herd composition, mortality, predation, harvest, movements and migration, trapping and tagging studies; concludes that more harvest needed to restore and maintain herd productivity at highest level; more harvest means antlerless hunts; habitat improvement of winter range necessary even though transitory and expensive.

Hughes, Eric and Rolf Mall
1958. Relation of the adrenal cortex to condition of deer. Calif. Fish and Game, vol. 44, no. 2, p. 191-196, 1 fig., 2 tbls.
Results of study to determine morphological picture of adrenal, to analyze variation within population, and to examine measurements with relation to condition; methods and materials; concludes that adrenal cortical size condition factor with reference to field conditions.

Jordan, P. A.
1958. Marking deer with bells. Calif. Fish and Game, vol. 44, no. 2, p. 183-189, 1 fig., 1 tbl.
Report of work begun on 260 specimens in 1955 on San Joaquin winter range, Madera County; marking materials and methods; physical and behavioral effects, susceptibility to predation and hunting.

ELK

Tule elk Cervus nannodes
Roosevelt elk Cervus canadensis roosevelti

Evermann, B. W.
1915. An attempt to save California elk. Calif. Fish and Game, vol. 1, no. 3, p. 85-96, 8 figs.
Original range, early records of occurrence from Viscaino in 1602; historical protection measures; 1914 transfer of herd from Kern County.

Evermann, B. W.
1916. The California valley elk. Calif. Fish and Game, vol. 2, no. 2, p. 70-77, 1 fig.
Details of elk transfer noted in Evermann (1915), list of 146 individuals distribution among nineteen parks and reservations, condition of herd, adaptation to new environment.

Evermann, B. W.
1928. The tule elk of California. Soc. Engineers, Yearbook, p. 20-22, 1 fig.
Former range, slaughters, protection, trapping and transplanting, refuge establishment.

Ainsworth, A. R.
1932. The tule elk. Calif. Fish and Game, vol. 18, no. 1, p. 81-83, 1 fig.
Habits, habitat, breeding season, feeding.

Borell, A. E.
1933. Yosemite elk herd moved to Owens Valley. Yosemite Nature Notes, vol. 12, no. 12, p. 107-109.
Methods and materials of transfer of herd from Yosemite enclosure; range and habitat descriptions.

Burtch, L. A.
1934. The Kern County elk refuge. Calif. Fish and Game, vol. 20, no. 2, p. 140-147, 3 figs.
History of transfer operations, legislation creating refuge.

Moffitt, James
1934. History of the Yosemite elk herd. Calif. Fish and Game, vol. 20, no. 1, p. 37-51, 8 figs.
Review of transplanting experiment; growth and condition of herd.

California Conservationist
1936. Roosevelt elk battle against extinction. Vol. 1, no. 3, p. 2, 15, 2 figs.
Recommendations for management following National Park Service study; habitat preference, range, illegal hunting, depredations, effect of cattle, sheep and logging.

Orr, R. T.
1937. Notes on the life history of the Roosevelt elk in California. J. Mamm., vol. 18, no. 7, p. 62-66.
Information based on studies in Humboldt and Del Norte Counties; habitat, food, habits and behavior, reproduction, probably predators; notes that Prairie Creek State Park assures permanent cover protection during summer months.

Murie, O. J.
1951. The elk of North America. Stackpole Co. and Wildl. Man. Inst., 376 p. 32 figs.
Habitat, life zones, migration, physical characters, life history notes and habits, management based on field notes at Yellowstone National Park.

Outdoor California
1951. [Tule elk herd reduction practices.] Vol. 12, no. 12, p. 2.
Survival on Tupman refuge, forage food supply, population condition, trapping and transplanting, availability of habitat.

Sayama, Kenji
1952. *Sarcocystis* in deer and elk of California. Calif. Fish and Game, vol. 38, no. 1, p. 99-104, 1 tbl.
Methods, materials; incidence, distribution, pathogenicity of parasite.
Note: condensation of MA thesis, Univ. Calif., 1950.

Dasmann, W. P.

1955. The Owens Valley elk herd. *Outdoor California*, vol. 16, no. 1, p. 6-8, 4 figs.

History of 1933-34 planting of fifty-six animals; range, habitat, migration, population estimate by aerial census 1943-1954, special hunts, mating and calving, annual increase, feeding habits, depredations, management practices; notes migration habits contrary to Rocky Mountain elk; adverse affect of artificial winter hay diet.

SIERRA NEVADA BIGHORN

Nelson sheep *Ovis canadensis nelsoni*
California sheep *Ovis canadensis californiana*

Muir, John
1874. The wild sheep of California. *Overland Monthly*, vol. 12, no. 4, p. 358-363.
Description, habits, habitat, winter migration and returns, site and description of beds, development of young, cliff scaling and descending activities, occasional predation by eagle and coyote.

Merriam, C. H.
1897. *Ovis nelsoni*, a new mountain sheep from the desert region of southern California. Biol. Soc. Wash., Proc., vol. 11, p. 217-218.
Description of species discovered by Death Valley Expedition in Grapevine Range; general characters, coloration, measurements.

Allen, J. A.
1912. Histological and nomenclatorial notes on North American sheep. Amer. Mus. Nat. Hist., Bull., vol. 31, p. 1-29, 4 figs., 1 tbl.
Recognized species, synonymy, type localities, geographic distribution, first discovery in 1800.
See Grinnell (1912) for comments on extinct species probability.

Grinnell, Joseph
1912. The bighorn of the Sierra Nevada. Univ. Publ. Zool., vol. 10, no. 5, p. 143-153, 4 figs., 3 tbls.
Investigation into reports of extinct form; methods and materials of expedition, description of specimens found; describes new subspecies as *Ovis cervina sierrae*, Sierra Nevada bighorn; geographic probabilities of spearate races; concludes distinctness of desert race with name *nelsoni;* Sonoran and Boreal forms probably do not intermingle.
See Allen (1912), p. 25, for report of probable extinction.

Ober, E. H.
1913. An almost unknown game species—the ovis or mountain sheep and his peculiarities. *Pac. Coast Golf and Outdoor Sports*, vol. 2, no. 1, p. 24-26, 4 figs.
Habitat and description of sierra and desert races; population estimates, food preferences, winter forage movements; notes cause of broken horn tips as prying among rocks for foods, not fighting.

Ober, E. H.
1915. Sierra mountain sheep on the increase. Calif. Fish and Game, vol. 1, no. 5, p. 236.
Results in Inyo County of total protective measure.

Cunningham, F. P.
1917. Mountain sheep at head of Kern River. Calif. Fish and Game, vol. 3, no. 4, p. 184.
Increase in numbers in Sequoia National Forest, wintering habits at Kennedy Meadows.

Gardner, C. L.
1918. Big horn sheep in the vicinity of Claremont, California. Calif. Fish and Game, vol. 1, no. 1, p. 17-21, 1 fig.
Evidence of small population on Mount San Antonio system; 1914 observation of band behavior, difficulty of obtaining life history notes.

Brownlow, O. P.
1926. Mountain sheep taken captive. Calif. Fish and Game, vol. 12, no. 2, p. 106-107.
Report of one individual found 75 miles from natural habitat considerably below timberline.

McLean, D. D.
1930. Desert mountain sheep of the Inyo Mountains. Calif. Fish and Game, vol. 16, no. 1, p. 79-82.
1929 observation on herd east of Big Pine; habits, feeding, drinking.

Ober, E. H.
1931. The mountain sheep of California. Calif. Fish and Game, vol. 17, no. 1, p. 27-39, 6 figs.
Description of Inyo County terrain; origin of herds, historical accounts of occurrence; habits and habitat, development, feeding; predator relationship with golden eagle.

Dixon, J. S.
1936. The status of the Sierra bighorn sheep. First No. Amer. Wild. Conf., Proc., p. 641-644.
Causes of reduction in numbers, habitat, summer migration, preservation attempts; notes hunting as most critical factor in decline.

California Conservationist
1937. Mountain sheep about "holding own." Vol. 2, no. 1, p. 9, 20, 2 figs.
Description and habits of Inyo County herd; population estimate, life span, feeding habits, mating and birth dates, predators.

Dixon, J. S. and E. L. Sumner, Jr.
1938. A survey of desert bighorn in Death Valley National Monument—Summer 1938. U. S. Natl. Park Ser., 46 p., 20 figs. (Typewritten) (Available at Calif. Fish and Game Library, Sacramento)
Effect of mineral discovery and subsequent active mining operations, poaching for meat and trophies, period of herd decline and comeback; survey itinerary, methods and materials; description of area, population numbers, drinking and browsing habits, effect of wild burro populations.

Allen, J. C.
1939. Ecology and management of Nelson's bighorn on the Nevada mountain ranges. Fourth No. Amer. Wild. Conf., Trans., p. 253-256.
History of herd reductions, regulatory measures; feeding route location, feeding ground preferences; rutting season, molt, lambing season, food preferences, drinking; control of movement and predators; notes poaching as major obstacle in way of preservation.

Dixon, J. S. and E. L. Sumner, Jr.
1939. A survey of desert bighorn in Death Valley National Monument. Calif. Fish and Game, vol. 25, no. 2, p. 72-96, 18 figs.
History of area, effect of human activity on ancestral watering holes, depletion by competition and persecution, effect of establishment as monument; details of extensive survey, range conditions; water, food, shelter supply; behavior and numbers of sheep seen; effect of wild burros; Indian petroglyphs, census plans for 1939; concludes that sheep on increase, no evidence of poaching.

Cowan, I. McT.
1940. Distribution and variation in the native sheep of north America. Amer. Midl. Nat., vol. 24, no. 3, p. 505-580, esp. p. 554-567, 24 tbls., 4 pls.
Results of examination of 761 specimens; history of species, range, distribution; secondary sexual, age, tooth succession, individual and geographic variations, molt and pelage, measurements.

Sumner, E. L., Jr.
1940. Special report on winter investigation of Death Valley bighorn, January 1940. U. S. Nat. Park Serv., 31 p., 25 figs. (Typewritten) (Available at Calif. Dept. Fish and Game Library, Sacramento, Calif.)
Census survey; forage conditions, description of areas, waterholes and springs, feral burro populations; concludes that bighorn remain at altitudes up to 8000 feet during fall and mov downward only enough to escape snow and inclement weather; serious competition by burros and domestic cattle on some of finest available range; ruination of range by domestic cattle and chief obstacle to recovery to original numbers; recommends development of seeps into sizable springs.

Jones, F. L.
1949. A survey of the Sierra Nevada mountain sheep. Univ. Calif., MA thesis, 154 p., 19 figs., 11 tbls. (Typewritten)
General ecological study preliminary to efforts to establish sanctuary; taxonomy, race history, interchange of Sierra and Nelson; decrease in range due to hunting, disease, domestic sheep competition, heavy human use; existing herd ranges, physical characteristics, vision, bands, lamb

development, behavior, food, water, minerals, mating season, decimating factors; concludes existence of five herds comprising about 400 individuals; herds range along Sierran Crest in summer, descending to lower, arid, eastern side in winter; *Hulsea algida*, *Carex congdonii* and *Polemonium eximium* most important foods; early November-mid December rut; lambing in May or June; winter most critical period; big survival of lambs over first summer; suggests population increasing; recommends complete hunting protection, maintenance of range as wilderness and elimination of domestic stock grazing on areas required for winter forage.

Note: adaptation appears in Sierra Club Bull., vol. 35, no. 6, p. 29-76.

National Parks Magazine

1950. The bighorns of Joshua Tree. Vol. 24, no. 102, p. 93-95, 2 figs.

Report on herd occasioned by Congressional bill to reduce and revise boundaries of Joshua Tree National Monument; federal and state protection of desert bighorn population, poaching, habitat, migrations; effect of proposed modifications.

Deming, O. V.

1952. Tooth development of the Nelson bighorn sheep. Calif. Fish and Game, vol. 38, no. 4, p. 523-529, 2 figs., 1 tbl.

Results of 14 skull examinations on Desert Game Refuge; development from birth to four years; notes similarity of development of all forms of North American wild and domestic sheep.

Robinson, C. S. and F. P. Cronemiller

1954. Notes on the habitat of the desert bighorn in the San Gabriel Mountains of California. Calif. Fish and Game, vol. 40, no. 3, p. 267-271, 1 fig., 1 tbl.

Description of area habitat differing greatly from remainder of areas occupied by species in state; summer, winter ranges, herd territory, straying individuals; food habits, numbers present, breeding and lambing; notes great threat of disturbance by humans; recommends continued protection from shooting, vigorous law enforcement, minimum development of trails in area.

Deming, O. V.

1955. Rearing bighorn lambs in captivity. Calif. Fish and Game, vol. 41, no. 2, p. 131-143, 5 figs., 3 tbls.

Report on experiments to obtain information on lambing and young lambs at Corn Creek Headquarters of Desert Game Range near Las Vegas, Nevada; presentation of data as guide to rearing species for study purposes; enclosures, pre-lambing care of ewes, overfeeding, supplemental rations, lambing indications, parturition, post-natal care, feeding of lambs; diseases.

Jones, F. L.

1955. Bighorn management problems in California. West. Assoc. State Game and Fish Comm., 35th Ann. Conf., Proc., p. 177-181.

General report on range inventories, population dynamics and ecology studies; 2500 population estimate, occurrence, movements, resident and transient herds; effect of early Indian hunting, domestic sheep scabies introduction, unregulated livestock grazing, severe winters; population and range potentials, usurpation by wild burros; emphasizes inadequacy of knowledge; recommends more realistic approach to wild burro protective measures.

Jones, F. L., Glenn Flittner and Richard Gard

1957. Report on a survey of bighorn sheep in the Santa Rosa Mountains, Riverside County. Calif. Fish and Game, vol. 43, no. 3, p. 179-191, 3 figs., 6 tbls.

Results of July 1953 study of State Game Refuge 4-D to establish distribution and numbers; methods; description of area, herd composition, food habits, range conditions, water, diseases and parasites, range competition; predation, poaching; estimates 351 population; concludes that availability of water most important limiting factor in distribution; heavy utilization of forage plants in vicinity of water; possible adverse effect of domestic goats and burros.

UPLAND GAME

GENERAL

Stephens, Frank

1906. California mammals. West Coast Publishing Co., p. 45-61, 86-88, 96-98, 184-195, 213-216, 224-225.

Type locality, abundance, distribution; life-history notes.

Bryant, H. C.

1915. California's fur-bearing mammals. Calif. Fish and Game, vol. 1, no. 3, p. 96-107, 2 figs.

Review of historical works mentioning abundance, demand, early fur trade, fur farm development, with recommendations for meeting decrease in numbers.

Wheelock, I. G.

1916. Birds of California. A. C. McClurg & Co., p. 114, 118-125, 127-130, 132-134.

Description, geographic distribution, breeding range and season, nest location and productivity.

Grinnell, Joseph, H. C. Bryant and T. I. Storer

1918. The game birds of California. Univ. Calif. Press. 642 p., 94 figs., 19 tbls., 16 pls.

Description, distribution, range, life history notes, predation; legislative history, gun clubs, introduction of non-native species, propagation.

Dawson, W. L.

1923. The birds of California. South Moulton Co., p. 1159-1167, 1567-1596, 1602-1608, figs. and pls.

Scientific and popular account; description, range, distribution, nesting, food, fecundity, hybridizations.

Grinnell, Joseph and A. H. Miller

1944. The distribution of the birds of California. Pac. Coast Avifauna, no. 27, Cooper Ornith. Club, p. 66-91, 113-125, 184-185, 563-565, figs. and pls.

Status, geographical and breeding range, habitat.

Ingles, L. G.

1947. Mammals of California. Stanford Univ. Press, p. 45-47, 50-51, 79-84, 117-118, 142-146, 178-181, 186-187, 194-226.

Range, distribution, habitat, life-history notes, management.

Sumner, E. L., Jr., and J. S. Dixon

1953. Birds and mammals of the Sierra Nevada. Univ. Calif. Press, p. 24-26, 50-59, 67-68, 293-307, 346-364, 391-395, 436-462, figs. and pls.

Material from Sequoia and Kings Canyon National Parks and previously unpublished life history observations by park naturalists and rangers; description, nesting, breeding, park status and records, migration, predation, effect of artificial feeding.

Edminister, F. C.

1954. American game birds of field and forest. Chas. Scribner's Sons, 490 p., 24 tbls., 98 pls.

Origin, classification, history, geographic range, description of species; life history notes, food habits, predation, disease and parasites, management.

California. Department of Fish and Game

1955. Upland game of California. Game Man. Br., Informational booklet, 39 p., 39 figs.

Distribution, range, habitat, habits, hunting importance.

Rudd, R. L. and R. E. Gennelly
1956. Pesticides: their use and toxicity in relation to wildlife. Calif. Dept. Fish and Game, Game Bull. 7, 209 p., 2 figs., 33 tbls.

Report of study designed to accumulate data on toxicity and uses of agricultural chemicals, to determine extent of wildlife loss from their use and to provide reference data for other research technicians; major legislation in field, production of pesticides, California acreage treated and amounts used, wildlife losses in California, toxicity vs. hazard, special problems and areas, significance of losses; recommendations for research, use and legislation; accounts of pesticides.

RING-NECKED PHEASANT

Phasianus colchicus

California. Fish and Game Commission

1916. The ring-necked pheasant as an insect destroyer. Calif. Fish and Game, vol. 2, no. 1, p. 49.

Notes reports from Massachusetts and Oregon analysis of stomach content, indication that crop damage by pheasants is "over-balanced by amount of noxious weeds and injurious insects they destroy."

Glading, Ben

1946. The role of the game farm in upland game bird management. West. Assoc. State Game and Fish Comm., 26th Ann. Conf., Proc., p. 114-119.

Initial introduction, attempts to pen-raise, state system beginning with Hayward farm in 1908, population establishment, effect of 1916 introduction of rice and subsequent importance, Butte and Kern county examples, experiments in South Dakota and Michigan; assets of game farms; concludes poor economy to continue planting in established populations; useless to dump, repeatedly, birds in areas of proven low value.

Quinn, Janet

1946. Pheasants flown to Guam. Calif. Fish and Game, vol. 32, no. 1, p. 32-33, 1 fig.

Notes July 1945 transport of sixty ten-week old specimens; food, water, cover requirements, absence of predators, lack of other upland game as competitors.

Twining, Howard

1946. Pheasant management problems. West. Assoc. State Game and Fish Comm., 26th Ann. Conf., Proc., p. 110-113.

Results of 1945-46 investigation, census, egg collections, destruction by mowing machines, effect of blackbird bait, movements of marked birds; notes non-applicability in California or results of research in other areas because of long dry season, low annual rainfall, crop dependency upon irrigation, presence of rice fields; concludes that incubation begins around April 15; 3.07 average harem size; 10.8 average clutch size; first and third mowing of alfalfa especially destructive; recommends development of effective flushing bars; control of predacious crows and feral house cats; refuge acquisition; placement of grit piles away from highways.

Herkenham, N. B.

1947. Food habits of the ring-necked pheasant *(Phasianus colchicus)* in the Sacramento Valley, California. Univ. Calif., MA thesis, 65 p., 4 figs., 28 tbls. (Typewritten)

Results of investigation conducted as integral part of California Division Fish and Game research program on life history and management of species; review of literature pertaining to pheasant and agriculture relationships, description of study area in northeast valley, land-use characteristics, climate, population density, 134 crop and gizzard analyses, economic relationships of food habits; concludes concentration of food habits in late afternoon and early morning after sunrise, most food taken from surface; seasonal variation in diet; by virtue of food habits species cannot be considered detrimental to agriculture in Sacramento Valley since almost entire diet consists of non-salvageable waste items and items neutral or harmful to farming; cannot justifiably be credited with beneficial role though slight positive value accrues in consuming harmful insects.

Note: bibliography of literature reporting studies in other states, p. 56-57.

Hjersman, H. A.

1947. A history of the establishment of the ring-necked pheasant in California. Calif. Fish and Game, vol. 33, no. 1, p. 3-11, 2 figs., 3 tbls.

Early liberations; history and operation of Hayward game farm and other farms in system; liberations by county 1926-1945.

Twining, Howard, H. A. Hjersman and Wallace MacGregor
1948. Fertility of eggs of the ring-necked pheasant. Calif. Fish and Game, vol. 34, no. 4, p. 209-216, 2 figs., 1 tbl.

Description of fertile and infertile eggs, materials and methods; notes that game farm tests show ratio of one cock to 24-50 hens results in normal fertility and reasonably short season coupled with adequate cover prevent hunters shooting down cocks to point endangering hen fertility; concludes that legal hunting in Sacramento Valley habitat little effect on field fertility.

Ferrel, C. M., Howard Twining and N. B. Herkenham
1949. Food habits of the ring-necked pheasant *(Phasianus colchicus)* in the Sacramento Valley, California. Calif. Fish and Game, vol. 35, no. 1, p. 51-69, 6 figs., 7 tbls.

Description of study area, collecting and analytical methods, diet of adults and chicks, crop contents, economic aspects, list of plant species in diet; concludes that of total yearly diet, 57% cultivated seed crops of which rice most important; 30% wild or weed seeds; rest fruits, flower buds, flowers, corm and roots; crop damage negligible in grain growing area because waste grain most consumed.

Ferrel, C. M., H. T. Harper and Jack Hiehle
1949. A progress report on pheasant hunting season studies for the years 1946, 1947 and 1948. Calif. Fish and Game, vol. 35, no. 4, p. 301-322, 11 figs., 11 tbls.

Results of study to obtain data on hunting pressure and success, old-young ratio of kill, calculations of total population, kill of game farm birds, comparison of stocked and unstocked area; description of study areas, daily kill per thousand acres, hunters per area, origin of hunters; concludes that Sacramento Valley habitat capable of providing high sustained yield; need for opening more posted land for hunting.

Harper, H. T., George Metcalfe and J. F. Davis
1950. Upland game cooperative hunting areas. Calif. Fish and Game, vol. 36, no. 4, p. 404-432, 9 figs., 28 tbls., appendix.

Establishment, operation and results of six areas in accord with Senate Bill 677, 1949; checking methods, description of areas; daily information from permits, release of game farm birds, numbers killed crippled and lost, band numbers, effort expended, use of dogs; reaction of hunters and landowners.

Herman, C. M. and Richard Kramer
1950. Control of gapeworm infection in game farm birds. Calif. Fish and Game, vol. 36, no. 1, p. 13-17, 1 fig.

Attempts at control, experiments on pens, cover damage; concludes that D-D or W-40 valuable adjunct to control in captive populations.

Harper, H. T., C. M. Hart and D. E. Shaffer
1951. Effects of hunting pressure and game farm stocking on pheasant populations in the Sacramento Valley, California, 1946-1949. Calif. Fish and Game, vol. 37, no. 2, p. 141-176, 18 figs., 20 tbls.

Four year study on two comparable areas in rice belt, one stocked and one unstocked; description of areas, checking methods, kill per acre and per day, kill of stocked and resident wild birds, hunting pressure and success, age and sex ratios, population indices; concludes that Sacramento Valley breeding population little affected by heavy hunting pressure and game farm stocking; no measureable lasting or cumulative effect in production increase by planting of game farm birds where optimum population exists; small benefit from continued stocking; decimated populations more economically and effectively stocked by removing native stock from inviolate refuges; need for more open hunting areas.

Hart, C. M., F. L. Jones and D. E. Shaffer.
1951. Pheasant cooperative hunting area results, 1950. Calif. Fish and Game, vol. 37, no. 4, p. 395-437, 7 figs., 33 tbls.

Operation and management of ten areas, hunting pressure and success, kill per unit and acre, game farm and native composition of kill, use of dogs, hunter and landowner reaction; notes greatest seasonal success on unstocked area.

Hart, C. M., J. F. Davis and W. F. Meyers
1952. Pheasant cooperative hunting area results, 1951. Calif. Fish and Game, vol. 38, no. 4, p. 597-604, 3 figs., 5 tbls.
Reports of eleven open areas; hunting pressure and kill, composition of kill, planting and kill of game farm birds.

Hart, C. M.
1953. Recent trends in California pheasant management. Wes. Assoc. State Game and Fish Comm., 33rd Ann. Conf., Proc., p. 161-166, 1 tbl.
Hunting pressure, cooperative and community hunting areas, preserves, game farm program, agricultural trends; concludes 20% increase in hunters in three years; approximately 475,000 acres under controlled hunting systems; game farm program reduced 30-35% with concentrations on stocking for gun; cleaner and more intensive farming gradually reducing pheasant populations.

Leach, H. R., C. M. Ferrel and E. E. Clark
1953. A study of the food habits of the ring-necked pheasant on irrigated pasture in California. Calif. Fish and Game, vol. 39, no. 4, p. 517-525, 4 figs., 2 tbls.
Results of collection of 101 birds throughout year and crop analyses; description of study area in vicinity of Oakdale, Stanislaus County; principal foods, monthly and yearly diets; cover types and abundance; density of population, brood counts, hunting pressure; concludes adequacy of diet; high nesting success because of mowing only once or twice a year if at all and frequent irrigation concentrating nesting on ridges and ditch banks.

Hart, C. M.
1954a. Last pheasant season—a look at the record. *Outdoor California*, vol. 15, no. 11, p. 4-7, 4 figs.
Hunting success, effort, quality; hen and chick counts, bag census, population composition, sex ratio, established populations and continuous stocking, carrying capacity, overshooting, comparison of stocked and unstocked areas; concludes that stocking impractical and uneconomical in areas where carrying capacity attained; no overshooting evidence; little relation between size of population and number stocked; stocked birds fail to make pen-to-field transition successfully.
See Hart (1955, 1957).

Hart, C. M.
1954b. Pheasant hunting pressures in California. West. Assoc. State Game and Fish Comm., 34th Ann. Conf., Proc., p. 219-226.
Hunter and pheasant range, cooperative areas, distribution and geographic source of seasonal pressure, harvest; notes two million acres of excellent habitat, less than ten acres per hunter.

Hart, C. M.
1955a. Pheasant survival studies in California. West. Assoc. State Game and Fish Comm., 35th Ann. Conf., Proc., p. 246-256, 4 tbls.
Progress report on three-year study; description of Sutter Basin study area, hunting and regulation, study methods and materials; mortality rates, band returns, trapping, age ratios, comparison with other studies, hunting versus non-hunting mortality, management; concludes 80% average annual cock mortality, 65% hens; 56% cock hunting mortality; cock population underharvested; recommends limited hen kill.

Hart, C. M.
1955b. We can shoot more pheasants. *Outdoor California*, vol. 16, no. 11, p. 6-7, 10, 2 figs.
Effect of longer season and liberalized hen shooting rules; fluoroscoping live specimens in Sutter Basin; notes that about 24% adult cocks and 5% hens carry shot.
See Hart (1954, 1957).

Lassen, R. W., K. E. Doty and R. D. Saucerman
1955. Sexing day-old ring-necked pheasant chicks by a color characteristic. Calif. Fish and Game, vol. 41, no. 3, p. 229-231, 1 fig.
Studies aimed at planting cocks for the gun; methods, success of sexing; concludes that using recognition of shape and extent of cheek patch and color characteristics results in 94% plus accuracy and cost of less than one-half cent per bird.

Rudd, R. L. and R. E. Genelly
1955. Avian mortality from DDT in California rice fields. *Condor*, vol. 57, no. 2, p. 117-118, 1 tbl.
Report of investigation in areas of sowing DDT-coated grain applied to control tadpole shrimp and scavenger beetle damage to seedlings; crop and gizzard analyses; detectable mortality during sowing period; results of experimental feeding; notes greater sensitivity of male pheasant to chemical, effect of applying chemical and seed separately.

Genelly, R. E. and R. L. Rudd
1956. Chronic toxicity of DDT, Toxaphene, and Dieldrin to ring-necked pheasants. Calif. Fish and Game, vol. 24, no. 1, p. 5-14, 1 fig., 3 tbls.
Reports response of 224 specimens to daily intake of insecticides at Yountville Game Farm; experimental conditions; mortality rates, food consumption, insecticide intake, weight changes, tissue analysis; recommends dosage of one-half pound per acre without hazard.

Hart, C. M., Ben Glading and H. T. Harper
1956. The pheasant in California. *In* Pheasants in North America. Stackpole Co. and Wildl. Man. Inst., p. 90-158, 14 figs., 12 tbls.
History of introduction and establishment of populations; habitats in differing areas, cover, irrigation, vegetation, climate; food and breeding habits, sex ratios, productivity, survival, harvest; stocking program, game farm system, transplanting, cooperative area program, predator control, licensed preserves, legislative history, trend of hunting; notes that population numbers have no relation to fluctuations in North Central and Middle Western states, but an expression of local weather effect on agricultural practices, and on nesting and hatching.

Hart, C. M.
1957a. Controlled pheasant hunting areas in California. West. Assoc. State Game and Fish Comm., 37th Ann. Conf., Proc., p. 256-264, 4 tbls.
History of system 1949-1956; cooperative and community areas, licensed game bird clubs; notes decrease to 130,000 acres for cooperative areas, trend toward private shooting preserves or hunting leases.

Hart, C. M.
1957b. Legal hen shooting helps hunters set pheasant record. *Outdoor California*, vol. 18, no. 6, p. 4-6, 1 fig.
Report on 1956 northern California season, second year of liberalized regulations; abundance, distribution, sex composition of kill, breeding stock remaining, hunter success and satisfaction, beg counts and checks, fluoroscope tests to reveal pellets; concludes that California population includes more females than needed to maintain or increase numbers and, if not harvested, wasted through natural losses.
See Hart (1954, 1955).

Hildebrand, Milton
1957. Determining the sex of dressed pheasants. Calif. Fish and Game, vol. 43, no. 2,
Study to assist in game law enforcement; description of sex differences from specimens raised at Yountville Game Farm; soft parts, feather color, skeleton; concludes no useful differences in relative body proportions and that linear measure of several bones offer certain identification.

QUAIL

California quail *Lophortyx californica*
Gambel quail *Lophortyx gambelii*
Mountain quail *Oreortyx picta*

Belding, Lyman
1892. Food of the grouse and mountain quail of central California. *Zoe*, vol. 3, no. 3, p. 233-234.
Seasonal shift in altitude and habitat, diet preference, juvenile preference for ants.

Barlow, Chester and W. W. Price
1901. Quail. *In* A list of the land birds of the Placerville-Lake Tahoe stage road. *Condor*, vol. 3, no. 6, p. 158-160, 1 pl.
Abundance in area, nest sites and contents, hatching dates, fall vertical migration, spring and summer non-flocking upward migration.

Belding, Lyman
1903. The fall migration of *Oreortyx pictus plumiferus*. *Condor*, vol. 5, no. 1, p. 18.
Notes possible reasons for migration.

Williams, J. J.
1903. On the use of sentinels by valley quail. *Condor*, vol. 5, no. 6, p. 146-148, 1 fig.
Notes on observations in Placer County foothills; flock habits, sentinel activity.

Gilman, M. F.
1907. The Gambel partridge in California. *Condor*, vol. 9, no. 5, p. 148-149.
Observations on western limit of species; distribution, abundance, description of area in south-eastern portion of state.

Bryant, H. C.
1912. The present and future status of the California valley quail. *Condor*, vol. 14, no. 4, p. 131-142, 2 figs.
Factors governing abundance, recommendations for conservation; speciation, increase and decrease in numbers by area; early hunting methods and numbers killed; effect of cover and food supply, grazing sheep, predation, disease, hunting pressure, weather.
Note: reprint appears in Calif. Fish and Game Comm., Game Bull. 1, p. 21-33 (1913).

Neale, George
1915. The California valley quail and introduced game birds. Calif. Fish and Game, vol. 1, no. 4, p. 153-155.
Nesting, feeding and breeding habits; practical immunity to extermination; pugnacity re relationship with pheasants.

Pierce, C. C.
1916. The effect of strychnine sulphate on California valley quail. Calif. Fish and Game, vol. 2, no. 1, p. 11-13, 2 tbls.
Results of a laboratory test to determine the effect on quail population on U. S. Public Health Service program to eradicate ground squirrels on account of plague infection; concludes that poisoned barley used does not affect quail under natural feeding conditions.

Bach, Ernest
1917. Mountain quail. Calif. Fish and Game, vol. 3, no. 3, p. 139.
Notes decrease in Stanislaus National Forest population, migration, nesting and feeding habits.

Kessel, J. F.
1921. Flocking habits of the California valley quail. *Condor*, vol. 23, no. 5, p. 167-168.
Report of 1919-1920 observations near Ripon; description of area; refuge and roosting places, possible definite travel route.

Hall, E. R.
1927. A commensal relation of the California quail with the California ground squirrel. *Condor*, vol. 29, no. 6, p. 271.
Observation in Strawberry Canyon in Berkeley Hills; notes squirrel shattering tarweed seed to ground and followed by quail eating.

O'Roke, E. C.
1929. The morphology of *Haemoproteus lophortyx* Sp. nov. *Science*, vol. 70, no. 1818, p. 432.
Observation on 312 specimens; diagnostic character of parasites, transmission by louse fly; notes that 45% of specimens parasitized with no significant effect.
Note: see O'Roke (1932) for full report.

deFremery, Herman
1930. Valley quail and sharp-shinned hawk. *Condor*, vol. 32, no. 4, p. 211.
Notes "freezing" behavior in presence of predator.

McLean, D. D.
1930. The quail of California. Calif. Div. Fish and Game, Game Bull. 2, 47 p., 14 figs., 3 tbls., 3 pls.
Description, relationships, distribution, range, habitat, movements, breeding; nest sites, sets, success; predators; introduction, trapping and liberation; flocking and flock numbers, feeding habits, methods of escape from danger.
Note: "Diseases and parasites of the valley quail," by E. C. O'Roke, appears as p. 35-37.

Compton, L. V.
1931. An unusual date for the occurrence of the young of the California quail. *Condor*, vol. 33, no. 6, p. 249.
Notes January appearance of parents and ten-day old brood on Eel River near Scotia.

Gander, F. F.
1931. Notes on the habits and development of young quail. *Condor*, vol. 33, no. 3, p. 86-88.
Nest construction, artificial hatching of thirteen young upon nest destruction, daily record and description of development, feeding habits, plumage development, domestication; notes no hatching between 7:30 p.m. and 6:30 a.m.; newly hatched preference for insect food; sexual character of plumage not distinguishable for seven weeks.

Grinnell, Joseph
1931. The type locality of the California quail. *Condor*, vol. 33, no. 1, p. 37-38.
Notes first naming in 1797, transplanting to England; subspecific application of *californicus*, race names *brunnescens* Ridgway and *vallicola* Ridgway, type locality as Monterey; concludes listing as *Lophortyx californica californica* (Shaw and Nodder), valley California quail; *Lophortyx californica brunnescens* Ridgway, coastal California quail; *Lophortyx californica catalinensis*, Santa Catalina Island California quail.

Henry, D. P.
1931. Species of Coccidia in chickens and quail in California. Univ. Calif., Publ. Zool., vol. 36, no. 9, p. 157-170, 1 tbl., 2 pls.
Occurrence, isolation, description, infection.

Price, J. B.
1931. Some flocking habits of the California quail. *Condor*, vol. 33, no. 1, p. 3-7, 1 fig., 3 tbls.
Report of observations on Stanford University campus 1927-1929; methods of banding and marking; size of nine separate flocks, type of roost; concludes that study area birds form definite flocks nearly always roosting in same trees; approximately same number in flocks during winter season; definite territory of about 120,000 square yards during winter with little flock interchanging.

Welch, W. R.
1931. The propagation of California quail in open breeding grounds. Calif. Fish and Game, vol. 17, no. 4, p. 421-425, 3 figs.
Abundance, range, seasons, state refuge system.

Hobmaier, Adele
1932. The life history and the control of the cropworm, *Capillaria contorta*, in quail. Calif. Fish and Game, vol. 18, no. 4, p. 290-296, 3 figs.
Effect on health of birds, spread to localities free of disease; methods of control; indicates more significant importance in game birds than in free-living quails.

O'Roke, E. C.
1932. Parasitism of the California valley quail by *Haemoproteus lophortyx*, a protozoan blood parasite. Calif. Fish and Game, vol. 18, no. 3, p. 223-238, 5 figs., 2 pls.
Comprehensive account of studies into parasites and diseases affecting distribution and numbers of quail; introduced and native relationship; host and geographic distribution, life history and transmission of parasite; pathology and disease symptoms in birds, problem of infection and immunity, influence of ecological factors; concludes that majority of infections light and benign and that partial immunity well established; transmitted by ectoparasitic louse fly.
Note: technical account and bibliography appears as Univ. Calif., Publ. Zool., vol. 36, no. 1 (1930).

Sumner, E. L., Jr.
1932. Life history and environmental requirements of the California quail. 19th Amer. Game Conf., Trans., p. 451-458.
Vegetation, water requirements, feeding habits, predation, banding studies; notes that predation less important than environment.

Compton, L. V.
1933. King snake eating eggs of California quail. *Condor*, vol. 35, no. 2, p. 71-72.
Observations in Tehama County, 1930; location and restoration of nest damaged by hoe; predation by snake; incubating female's return after snake killed five feet from nest; hypothesis for explaining broken-wing trick as result of fear.

True, G. H., Jr.
1933a. The quail replenishment program. Calif. Fish and Game, vol. 19, no. 1, p. 20-24, 2 figs.
Development of the artificial supplementation of water in arid areas; establishment of refuge systems; incidental mention of quail habits.

True, G. H., Jr.
1933b. More about the quail refuges. Calif. Fish and Game, vol. 19, no. 4, p. 248-252, 3 figs.
Progress report of programs; numbers planted, habits, predators.

Wythe, M. W.
1933. California quail attacked by gopher snake. *Condor*, vol. 35, no. 1, p. 34.
Notes predation, female held in jaws and released, swallowing of eggs.

True, G. H., Jr.
1934a. An experiment in quail importation. Calif. Fish and Game, vol. 20, no. 4, p. 365-370, 2 figs.
Report of two-year restocking experiment; method of trapping, transplanting, releasing; cover requirements; notes cost of importing 8297 birds at $0.23 each.

True, G. H., Jr.
1934b. Quail banding returns for 1932 and 1933. Calif. Fish and Game, vol. 20, no. 4, p. 371-374, 2 figs.
Report on program inaugurated in July, 1932; type of band used, method of trapping and releasing; notes insufficient time for conclusions on 17,567 banded and 69 recovered.

Sumner, E. L., Jr.
1935. A life history study of the California quail, with recommendations for its conservation and management. Calif. Fish and Game, vol. 21, no. 3, p. 167-256, 15 figs., 12 tbls., and vol. 21, no. 4, p. 277-342, 59 figs.
Feeding habits and preferences, effect of weather, enemies and breeding season; mannerisms, distances traveled, amount eaten daily and yearly; water and ecological requirements; effect of human activity; social organization, formation and range of coveys; courtship and nesting

behavior; care, growth and behavior of young; mortality, predators; population study, weight fluctuations and plumage; food and cover requirements; recommendations refuge sites, predation and control; bibliography, p. 338-342.

Note: see Linsdale (1936) for observations regarding acorn as food.

Linsdale, J. M.
1936. California quail feeding upon acorns. *Condor*, vol. 38, no. 3, p. 126.
Notes observation in Berkeley vacant lot; description of area; crushing of shells prior to eating; possibility of local dietary adaptations for available food.

Note: see Sumner (1935) for conclusions regarding acorn as food.

Emlen, J. T., Jr.
1938. Fire ants attacking California quail chicks. *Condor*, vol. 40, no. 2, p. 85-86.
Observations at Davis of thirty-two nests; notes killing of chicks and entering through pip-hole in shell; treatment with powder.

Emlen, J. T., Jr. and Ben Glading
1938. California ground squirrel robs nest of valley quail. *Condor*, vol. 40, no. 1, p. 41-42.
Report of 1937 observation on San Joaquin Experimental Range east of Madera; location of nest, egg count, parental activity.

Glading, Ben
1938a. A male California quail hatches a brood. *Condor*, vol. 40, no. 6, p. 261.
Observations at San Joaquin Experimental Range; description and locality of nest; male incubation and hatching after death of female; notes substantiation of statements by Price (1938).

Glading, Ben
1938b. Studies on the nesting cycle of the California valley quail in 1937. Calif. Fish and Game, vol. 24, no. 4, p. 318-340, 11 figs., 4 tbls.
Results of study at San Joaquin Experimental Range; general quail habits prior to nesting, methods of nesting, construction of nest, cover, nesting habits, predators, average clutch and brood size.

Note: condensation appears in *Calif. Conservationist* (1939), vol. 4, no. 1, p. 3-6.

Horn, E. E.
1938. Some relationships of quail and ground squirrels in California. J. Wild. Man., vol. 2, no. 2, p. 58-59.
Abundance, predations, population restrictions and control; concludes strong indication that ground squirrel predation on eggs factor influencing quail population density.

Rahm, N. M.
1938. Quail range extension in the San Bernardino National Forest—progress report, 1937. Calif. Fish and Game, vol. 24, no. 2, p. 133-158, 16 figs., 5 tbls.
Report of program initiated in summer of 1936 prompted by development of watering device to help establish quail in areas where absent because of environmental factors; constituents of good quail range, problems involved in extension, history of area; use and installation of water tanks, effect of water development, biota in general.

Price, J. B.
1938. An incubating male California quail. *Condor*, vol. 40, no. 2, p. 87.
Observations on Stanford University campus; suggests killing of female and male taking over.

Note: see Glading (1938).

Emlen, J. T., Jr.
1939. Seasonal movement of a low-density valley quail population. J. Wild. Man., vol. 3, no. 2, p. 118-130, 3 figs., 1 tbl.
Description of study area at Davis campus of University of California, population, cover; distribution, winter covey territory interrelationships, spring dispersal, summer movements; concludes irregular winter shifts within territory; extra-territorial movements restricted by inter-covey spacial barrier; covey breakup for nesting season; return to approximate territory.

Horn, E. E.
1939. Factors in nesting losses of the California valley quail. U. S. D. A., Wildlife Leaflet, BS 124, 7 p.
Results of cooperative San Joaquin Experimental Range study; location, description and history of range; habitat, hunting pressures, population and food supply fluctuations, drought, natural enemies, nest destruction, food consumption, effect of rodent control; concludes that unseasonable rain during nesting period causes some loss; lack of breeding follows drought; ground squirrels most serious check upon quail breeding; removal of squirrels by poison results in marked increase in quail food and numbers and that poisoning not detrimental to birds.

Jewett, S. G.
1939. A rattlesnake kills a California quail. *Condor*, vol. 41, no. 1, p. 30.
Observations at Tule Lake Wildlife Refuge, Siskiyou County; notes need for additional research on relationship.

Leopold, A. S.
1939. Age determination in quail. J. Wild. Man., vol. 3, no. 3, p. 261-265, 3 tbls., 1 pl.
Result of examination of 581 specimens; primary coverts, outer primaries, premature replacement of coverts, failure to complete first postnuptial molt; concludes outer two primaries and greater upper primary coverts of juvenal plumage normally carried through first year; presence of at least some juvenal coverts best means of identity as young birds.

Emlen, J. T., Jr.
1940. Sex and age ratios in survival of the California quail. J. Wild. Man., vol. 4, no. 1, p. 92-99, 3 figs., 3 tbls.
Analysis of 17,632 specimens; ratios, development, survival, population levels in Sacramento valley, winter environment requirements; indicates low survival past first winter and compensating high net replacement.

Glading, Ben
1940. A much-needed study of the quail. *Calif. Conservationist*, vol. 5, no. 10, p. 1, 22-23.
Description of Coast Counties Quail Investigation to determine causes of population decline; possible cause, areas for study.

Glading, Ben, H. H. Biswell and C. F. Smith
1940. Studies on the food habits of the California quail in 1937. J. Wild. Man., vol. 4, no. 2, p. 128-144, 2 figs., 3 tbls., 4 pls.
Bioecological study at San Joaquin Experimental Range; description of area, climate, vegetation, cover, food items by frequency and percentage of volume, relation between food proportions and plant cover composition.

Hawbecker, A. C.
1940. Planting for California wildlife. Calif. Fish and Game, vol. 26, no. 3, p. 271-277, 4 figs., 1 tbl.
Results of agronomic practices in Watsonville study area; area history, vegetation, farming practices, carrying capacity, census, other wildlife present.

Richardson, Frank
1940. Quail. *Calif. Conservationist*, vol. 5, no. 11, p. 10, 1 fig.
Purposes of banding program.

Glading, Ben
1941. Valley quail census methods and populations at the San Joaquin Experimental Range. Calif. Fish and Game, vol. 27, no. 2, p. 33-38, 3 figs., 1 tbl.
Details of counting procedures, population estimates.

Price, J. B. and C. H. Danforth
1941. A persistent mutation in the California quail. *Condor*, vol. 43, no. 6, p. 253-256, 3 figs.
Recorded observations of forty-five year occurrence of fawn or "dove-colored" variant in normal plumage; protocol of experiments on specimens captured and hatched on Stanford University campus; effect of dilute factor; persistence of genes for adverse traits in wild populations.

Richardson, F.
1941. Results of the Southern California quail banding program. Calif. Fish and Game, vol. 27, no. 4, p. 234-249, 5 figs., 1 tbl.
Comparison of yearly returns, 1932-1940, degree of completeness, periods of freedom, distance from points of liberation.

Herman, C. M. and Ben Glading
1942. The protozoan blood parasite *Haemoproteus lophortyx* O'Roke in quail at the San Joaquin Experimental Range. Calif. Fish and Game, vol. 28, no. 3, p. 150-153, 3 figs., 2 tbls.
Data on prevalence, intensity of infection in different age groups.

Herman, C. M. and H. Jankiewicz
1942. Reducing coccidiosis in California valley quail during captivity. Calif. Fish and Game, vol. 28, no. 3, p. 148-149, 1 fig.
Life cycle of parasite, methods of infection and reduction.

Herman, C. M., H. A. Jankiewicz and R. W. Saarni
1942. Coccidiosis in California quail. *Condor*, vol. 44, no. 4, p. 168-171, 3 tbls.
Data from 121 birds of San Joaquin Experimental Range; percentages, intensity of infection, possible seasonal variations.

Howard, W. E. and J. T. Emlen, Jr.
1942. Intercovey social relationships in the valley quail. Wilson Bull., vol. 54, no. 3, p. 162-170, 1 fig., 1 tbl.
Results of 1939-1940 experiment at University of California Davis campus; range conditions, observations, bird behavior, homing, territorial and residence dominance; concludes that homing behavior poorly developed in quail under observation; alien birds quickly recognized and forcibly excluded from established coveys; aliens attacked by members of own sex; social barriers discourage intercovey mixing.

Glading, Ben
1943. A self-filling quail watering device. Calif. Fish and Game, vol. 29, no. 4, p. 157-164, 10 figs.
Development, description, construction and installation of "gallinaceous guzzler"; notes invasion of bees preventing use by quail.
See Glading and Selleck (1943).

Glading, Ben and D. M. Selleck
1943. A bee repellent for use in quail watering devices. Calif. Fish. and Game, vol. 29, no. 4, p. 165-167, 1 fig.
Notes tremendous capacity of bees for water (50 gallons in 10 days) and competition with quail; method of treatment.
See Glading (1943).

Herman, C. M. and J. E. Chattin
1943. Epidemiological studies on coccidiosis of California quail. Calif. Fish and Game, vol. 29, no. 4, p. 168-170, 4 figs., 2 tbls.
Materials and methods of study conducted at Los Angeles Wildlife Disease Research Station of U. S. Fish and Wildlife Service; results of examination of 3500 fecal samples; incidence and relative intensity.

Herman, C. M., J. E. Chattin and R. W. Saarni
1943. Food habits and intensity of coccidian infection in native valley quail in California. J. Parasitology, vol. 29, no. 3, p. 206-208, 1 fig.
Results of 342 fecal sample examinations; type of food consumed; seasonal food habits, infection intensity, rainfall.

Selleck, D. M. and Ben Glading
1943. Food habits of nesting barn owls and marsh hawks at Dune Lakes, California, as determined by the "cage nest" method. Calif. Fish and Game, vol. 29, no. 3, p. 122-131, 2 figs., 4 tbls.
Methods, nest studies, daily list of items; concludes that barn owl desirable raptor on quail management area; marsh hawks take considerable quantities of young quail when available.

Glading, Ben
1944. Effect of hunting on a valley quail population. Calif. Fish and Game, vol. 30, no. 2, p. 71-79, 5 figs., 4 tbls.

Results of study of shootable surpluses at San Joaquin Experimental Range; details of hunting experiment cooperative; hunting pressure, population dynamics, cripple loss; shooting equipment, use of dogs and loss of cripples; sources of error.

Emlen, J. T., Jr. and Ben Glading

1945. Increasing valley quail in California. Univ. Calif., Agric. Exp. Sta., Bull. 695, 56 p., 29 figs., 4 tbls.

Partial report on eight-year intensive study; principles and methods of management, establishing populations, California habitat, encouraging natural vegetation, artificial and temporary shelters; food, water and cover requirements; predators, disease and parasites, harvest; hunting areas, privileges and rights; concludes that liberation of game farm birds hazardous to wild population; habitat management and improvement of fundamental significance; aggressive, persistent, selective predator control locally concentrated can be effective.

Glading, Ben, R. W. Enderlin and H. A. Hjersman

1954. The Kettleman Hills quail project. Calif. Fish and Game, vol. 31, no. 3, p. 139-156, 12 figs., 3 tbls.

Description of area, history of development, 1941 refuge establishment; feeding experiment, bird and predator census methods, competitors; watering experiment; plans for use as "natural game farm" study area and habitat improvement.

Glading, Ben, D. M. Selleck and F. T. Ross

1945. Valley quail under private management at the Dunes Lakes Club. Calif. Fish and Game, vol. 31, no. 4, p. 167-183, 4 figs., 7 tbls.

History and description of area along southern coast of San Luis Obispo County; introduction of birds, artificial feeding and watering, predator studies and control, cover and food plant improvements; management, harvest, cost; population studies, nesting, food habits, diseases.

Herman, C. M.

1945. Gapeworm in California quail and chukar partridge. Calif. Fish and Game, vol. 31, no. 2, p. 68-72, 3 figs.

Symptoms, life history, transmission; prevention in captive birds, mortality rates, treatment.

McMillan, I. I.

1947. Establishment of artificially propagated quail. *Condor*, vol. 49, no. 4, p. 170.

History of 1946 planting of twelve pairs near Shandon, San Luis Obispo County; food, water, cover; acceptance of habitat, pairing, breeding, roosting, late hatching, watering places; activities of hawks and feral house cats.

Herman, C. M. and A. I. Bischoff

1949. The duration of *Haemoproteus* infection in California quail. Calif. Fish and Game, vol. 35, no. 4, p. 293-299, 1 fig., 1 tbl.

Results of study instigated to find basis for evaluation of survey data obtained from blood smears of trapped wild birds; materials and methods; duration, intensity and nature of infection.

Macgregor, W. G.

1950. The artificial roost—a new management tool for California quail. Calif. Fish and Game, vol. 36, no. 3, p. 316-319, 3 figs.

Development by rancher Ian MacMillan in San Luis Obispo County to provide additional roosting cover as protection from nocturnal predators; construction by Division in other areas; description of roost; best location; notes additional habitat improvement work with deciduous blue oak trees.

Macgregor, W. G. and Manley Inlay

1951. Observations on the failure of Gambel quail to breed. Calif. Fish and Game, vol. 37, no. 2, p. 218-219.

Observations in Colorado and Mojave Desert regions, 1950; crop analysis, seed and insect diet, no green feed; four month delay of breeding season until after heavy summer rains and resultant sprouting annuals; concludes that lack of green feed and vitamins therein responsible for failure to pair and nest.

Ross, Fred
1951. California's quail development program. West. Assoc. State Game and Fish Comm., 31st Ann. Conf., Proc., p. 124-130.
Mainly devoted to development, construction, placement and materials of gallinaceous guzzler; outline, history, methods and materials of federal aid projects; predator control studies, trapping operations.

Biswell, H. H. and others
1952. Management of chamise brushlands for game in the north coast region of California. Calif. Fish and Game, vol. 38, no. 4, p. 453-484, 19 figs., 4 tbls.; especially p. 464.
Progress report of 1948-1951 investigation mainly in Lake County to determine whether game populations build up under brushland management and most satisfactory way to manipulate cover to increase production; description of areas, vegetation, soils, climate, land management pattern; burning, grazing, control of sprouts, mechanical and chemical control of brush, reseeding; density of population, altitudes, effect of wildfire burning and opening brush, secretive habits.

Sayama, Kenji and Oscar Brunetti
1952. The effects of sodium fluoroacetate (1080) on California quail. Calif. Fish and Game, vol. 38, no. 3, p. 295-300, 2 tbls.
Description of symptoms and pathology obtained under laboratory conditions; development of rodenticide during World War II; use and control in California; materials and methods; minimum lethal dose, autopsies, histopathological sections; concludes that 1080 extremely toxic to quail.

Leach, H. R. and W. H. Frazier
1953. A study of the possible extent of predation on heavy concentrations of valley quail with special reference to the bobcat. Calif. Fish and Game, vol. 39, no. 4, p. 527-538, 3 figs., 4 tbls.
Results of predator stomach analyses to determine vulnerability of birds in areas of "gallinaceous guzzlers"; description of study area in southeastern corner of Temblor Range; list of predators and prey; supplementary comparison of food predilections of bobcats from study area and state-wide collection; concludes that 41.3% of prey of 93 predators consisted of rodents; staple food of bobcat and coyote consist of rodents and lagomorphs; only three occurrences of quail in 221 bobcat stomachs casting doubt on widely accepted belief that ground predators prey heavily on adult quail and on need for predator control even around water sources.

MacGregor, Wallace
1953. An evaluation of California quail management. West. Assoc. State Game and Fish Comm., 33rd Ann. Conf., Proc., p. 157-160, 1 tbl.
Brief history of gallinaceous guzzler program; experimental areas, habitat requirements, effect of livestock, quail movements and maximum space between units, effect of guzzlers on nesting success and survival, importance of site; concludes one-half to three-quarters mile daily radius of movement of California quail in semi-arid ranges; most birds drink once per day, each utilizing fifteen grams per day and up to three quarts per year.

Dwyer, E. V.
1955. Ultimate water requirements in the Feather River drainage basin for fish and game. *In* Northeastern counties investigation: report on Upper Feather River service area. Calif. Div. Water Resources, Appendix D, 42 p., 7 tbls., 1 pl.
Hunting and fishing development, description of stream sections, effects of major developments, improvement projects, hunting pressure and value; notes possible reduction or elimination of quail population by impoundment of water.

Genelly, R. E.
1955. Annual cycle in a population of California quail. *Condor*, vol. 57, no. 5, p. 263-285, 9 figs.
Results of three-year trapping study in Tilden Park area of Contra Costa County to determine extent and causes of density changes on relatively undisturbed area; description of study area, climate, rainfall,

vegetation, topography; trapping and marking methods; age determination, courtship behavior, relationship of prior mating and age to pairing, pair bond, calling, fighting, territoriality, status of unmated male, molt, growth and weight; concludes that population monogamous usually choosing new mates each spring; pair bond strongly maintained during breeding season; paired birds fight intruders to preserve bond and protect young; sequence of primaries replacement useful clue to age.

Note: also appears as Univ. Calif., Ph.D. thesis (1955).

McMillan, I. I.

1955. An observation of flight exhaustion in California quail. *Condor*, vol. 57, no. 3, p. 188.

Experience in San Luis Obispo County of picking up birds by hand after flight.

Gullion, G. W.

1956. Evidence of double-brooding in Gambel quail. *Condor*, vol. 58, no. 3, p. 232-234, 2 tbls.

Observations in Clark County, Nevada, on California border; brood composition at guzzlers, nesting, hatching peak and food crop productivity height, second nestings, early "weaning" of first young; concludes 14.4 chicks per brood average; first brood delegated to care of cocks.

CHUKAR PARTRIDGE

Alectoris graeca

California Conservationist

1936. Chukar partridge now success in state. Vol. 1, no. 11, p. 10-11, 2 figs.

Original distribution, introduction into California, description, habitat, range, breeding, nest construction, average clutch, food preferences, liberation numbers and areas.

Bade, August

1937. The chukar partridge in California. Calif. Fish and Game, vol. 23, no. 3, p. 233-236, 2 figs.

Description of birds, productivity and fertility, domestic breeding experiences; history, rearing and releasing of foundation stock imported from India; habitat preference.

Note: also appears in *Calif. Conservationist*, vol. 3, no. 6, p. 4-5 (1938).

Herman, C. M. and G. B. Moray

1941. Experimental disease studies of chukar partridges (*Caccabis chukar*) in cooperation with Los Serranos Game Farm, Chino, California. Works Proj. Adm., Official Proj. No. 65-2-07-344, 21 p., with tbls. in text. (Processed)

Report to California Division of Fish and Game of experiments to determine etiological agents responsible for losses; autopsies; disease isolations, bacteriology, pathogenicity; bacterin experiments.

Herman, C. M.

1945. Gapeworm in California quail and chukar partridge. Calif. Fish and Game, vol. 31, no. 2, p. 68-72, 3 figs.

Symptoms, life history, transmission; prevention in captive birds, mortality rates, treatment.

McLean, D. D.

1954. The chukar partridge in California. West. Assoc. State Game and Fish Comm., 34th Ann. Conf., Proc., p. 240-243.

History of introduction, range, habitat, mushrooming population centers in 1949, drouth and annual plant reproduction as limiting factors, diet, walking propensities, steep downhill flight to water, jumping activities, predation; concludes drouth as governing factor in breeding; tremendous recuperative powers of general population.

Outdoor California

1956. Chukar poses puzzle to frustrated southern hunters. Vol. 17, no. 5, p. 6-8, 4 figs.

Prelude to third open season; history of imports, liberations, total numbers released, areas, natural increases, adaptability, habitat preference; study area survey to determine management policies, mating activities, brood and nesting observations, nest predation by ravens, incubation behavior, seasonal distribution, leg band returns, wild and game farm birds.

Harper, H. T., B. H. Harry and W. D. Bailey

1958. The chukar partridge in California. Calif. Fish and Game, vol. 44, no. 1, p. 5-50, 14 figs., 27 tbls.

History of 52,184 liberations of game farm and 2899 transplantings of wild-trapped specimens, 1932-1955; success by county; description of two study areas, topography, water, vegetation, agriculture; life history, nesting, distance from water, brood data, hatching dates, factors affecting reproduction, mortality of young and adults, water requirements; food habits by study area, seasonal and altitudinal distribution, distances moved, competition with native game, conflicts with agriculture; diseases; hunting season results, hunter success, band returns, recommendations for management; trapping and banding methods, installations of gallinaceous guzzlers; concludes that most successful plants in desert and semi-arid regions with less than ten inches yearly precipitation; mating occurs February-March, hatching late April-August, peak occurring middle of May-first week in June; average clutch size 11 or 12; little

predation; below sea level to 12,000 feet distribution; Russian thistle predominant food with grasses next in Inyo-Mono area; red-stemmed filaree first and fiddle-neck second in importance in Temblor area; no serious competition with native game; relative absence of disease; successful plants from airplane by free-fall dropping; low hunter success result of terrain, not abundance.

Note: material containing field data is presented in progress reports in West. States Chukar Comm., Quarterly Rept., vol. 1, nos. 1 and 2 (1954) and vol. 2, nos. 2, 3, and 4 (1955).

SAGE GROUSE (SAGEHEN)

Centrocercus urophasianus

Courtwright, G. W.
1916. Courting of the sage-hen. Calif. Fish and Game, vol. 2, no. 3, p. 163.
Territorial action, antics during courtship.

Manly, W. M.
1916. Sage hens in the Mono National Forest. Calif. Fish and Game, vol. 2, no. 3, p. 163.
Increasing population from Bridgeport south due mainly to restricted grazing prohibiting sheep tramping on nests.

Ober, E. H.
1920. Life history of the sage hen. Calif. Fish and Game, vol. 6, no. 1, p. 12-14.
Distribution, habitat, predators, feeding, courting and nesting habits.

Jewett, S. G.
1925. Nesting of the sage-hen in Siskiyou County, California. *Condor*, vol. 27, no. 3, p. 115-116.
Observations at Lower Klamath Lake; description of area, strutting grounds, nest and egg fragments; possible coyote predation.

Hanna, W. C.
1936. Sage hen breeding in California. *Condor*, vol. 38, no. 1, p. 38.
Notes infertile egg collected in Modoc County in 1916 and possible first record.

Rowley, J. S.
1939. Sage hen. *In* Breeding birds of Mono County, California. *Condor*, vol. 41, no. 6, p. 248.
Habitat description; nest location, construction and contents; young.

Leach, H. R. and A. L. Hensley
1954. The sage grouse in California, with special reference to food habits. Calif. Fish and Game, vol. 40, no. 4, p. 385-394, 3 figs., 5 tbls.
History of regulations; hunter success during 1950, 1951 and 1952 seasons; age ratios, weight, stomach analyses; concludes that in Lassen County, grasshoppers constitute 32.5% total volume consumed, sagebrush leafage 29.3%, prickly lettuce flowers 21.0%; in Mono County sagebrush 63.9%, various other plants of minor importance.

Leach, R. H. and B. M. Browning
1958. A note on the food of the sage grouse in the Madeline Plains area of California. Calif. Fish and Game, vol. 44, no. 1, p. 73-76, 1 fig., 1 tbl.
Stomach analyses to determine diet contribution of agricultural species grown on waterfowl management area; description, vegetation, agriculture of area; listing of 85 items eaten, volume and frequency; concludes that in study area, prickly lettuce and common sagebrush important seasonal items; no evidence of cultivated plants utilization.

MOURNING DOVE

Zenaidura macroura

Barlow, Chester and W. W. Price
1901. Dove. *In* A list of the land birds of the Placerville-Lake Tahoe stage road. *Condor*, vol. 3, no. 6, p. 160.
Abundance, nest sites and content; notes rare occurrence.

Gifford, E. W.
1909. The mourning dove (*Zenaidura carolinensis*) in captivity. *Condor*, vol. 11, no. 3, p. 84-85
Notes courtship, nesting, territoriality behavior; hatching dates and success.

Howell, A. B.
1912. Unusual nesting date of mourning dove. *Condor*, vol. 14, no. 2, p. 73-74.
Notes December incubation and parents death from fumigants.

Fortiner, J. C.
1921. The doves of Imperial County, California. *Condor*, vol. 23, no. 5, p. 168.
Observations to determine extent of breeding season; numbers of nests, dates, number of eggs or young.

Bryant, H. C.
1926. Life history and habits of western mourning dove. Calif. Fish and Game, vol. 12, no. 4, p. 175-180, 2 figs.
Description, habitat, breeding season, nesting; predators; value of feeding habits exclusively on weed seeds; need for protection during nesting season.

Lippincott, William
1927. Doves winter in Siskiyou County. Calif. Fish and Game, vol. 13, no. 3, p. 221.
Notes occurrence of dove populations southwest of Yreka; food and cover.

Stoner, E. A.
1931. Another example of frailty in mourning dove nest construction. *Condor*, vol. 33, no. 6, p. 254.
Observations in Merced County; conditions and materials of nest, durability of eggs when dropped to soft sand below.

Graham, J. D.
1938. A September mourning dove's nest. *Condor*, vol. 40, no. 1, p. 40.
Observations at Benicia.

Brooks, S. C.
1943. Speed of flight of mourning doves. *Condor*, vol. 45, no. 3, p. 119.
Observations of forty-five mile per hour flight for one or two minutes; fixation of image stimulus.

Mayer, W. V.
1943. Observations on the speed of the mourning dove. *Condor*, vol. 45, no. 1, p. 38.
Occurrence near Mariposa; notes forty-mile per hour flight, slow wing beat and absence of fatigue.

Neff, J. A.
1945. Maggot infestation of nestling mourning doves. *Condor*, vol. 47, no. 2, p. 73-76.
Report of special study in Stanislaus and Merced Counties, 1936-1940; other hosts in literature, season and degree of infestation, concealment, manner of attack, action of infested specimens, effect upon doves; pupation, species of fly, natural controls; concludes that blowfly maggot parasites important factor in nest mortality, since nestlings fall to ground in attempt to dislodge maggots.

Herman, C. M.
1950. Trichomoniasis, a disease of mourning doves. U. S. Fish and Wildlife Ser., Wildlife Leaflet 331, 2 p.
Presentation of information to facilitate recognition of disease; nature of infection, symptoms, effects, transmission, factors contributing to spread.

Duff, C. V.
1951. Mourning doves raise triplets. *Condor*, vol. 53, no. 5, p. 258-259.
Observations in Hollywood front yard; platform for flimsy nest, nest destruction by scrub jay, feeding of young, activity pattern.

Biswell, H. H. and others
1952. Management of chamise brushlands for game in the north coast region of California. Calif. Fish and Game, vol. 38, no. 4, p. 453-484, 19 figs., 4 tbls., especially p. 464.
Progress report of 1948-1951 investigation mainly in Lake County to determine whether game populations build up under brushland management and most satisfactory way to manipulate cover to increase production; description of areas, vegetation, soils, climate, land management pattern; burning, grazing, control of sprouts, mechanical and chemical control of brush, reseeding; density of population, effect of wildfire burns and opening brush.

Cowan, J. B.
1952. Life history and productivity of a population of western mourning doves in California. Calif. Fish and Game, vol. 38, no. 4, p. 505-521, 6 figs., 7 tbls.
Report of data obtained 1948-1952 at Gray Lodge Refuge, Butte County; description of area; pre-nesting status, nesting sites, nest construction; nesting season and production, eggs, incubation; growth, care, mortality of young; feeding, watering, roosting habits; concludes that nesting mid-March through September 20; 96% of nests contained two eggs; each pair averaged 5.1 nestings; 10% of all broods still in nests when season opened; nesting success 64.5%.
Note: adapted from MA thesis, Univ. Calif., 1952.

MacGregor, Wallace
1956. The dove is holding its own. *Outdoor California*, vol. 17, no. 6, p. 8-9, 2 figs.
Popularity and importance as game bird; habitat, distribution, range, feeding and nesting habits, guzzler installations, nesting cones; hunting seasons, regulations and harvest; aluminum and color-banding; nesting loss from high winds, rodents, snakes and predatory birds and mammals.

Cowan, J. B.
1957. Nests of wire help careless doves improve on Nature. *Outdoor California*, vol. 17, no. 7, p. 10-11, 2 figs.
Nesting cone experiments at Gray Lodge Refuge Area; natural slapdash methods of construction, nest losses; methods and materials of cone construction, installation recommendations.
Note: studies conducted on author's own time toward doctorate degree.

Macgregor, W. G.
1958. A technique for obtaining food habits material from nestling doves. Calif. Fish and Game, vol. 44, no. 1, p. 77-78.
Discussion of approach to gain information on eect of species on agriculture toward end of necessary types of agriculture and management practices for species food production; method and duration of "pigeon milk" feeding; use of tube inserted into crop, precautions; mentions nesting period as advantageous to data collection without removing population members.

SOOTY GROUSE

Dendragapus fuliginosus

Belding, Lyman
1892. Food of the grouse and mountain quail of central California. *Zoe*, vol. 3, no. 3, p. 232-233.
Great variety in autumn with thimbleberry and service berry most common, young preference for heads and green leaves of red clover, seasonal change in habitat and range, winter dependence upon hemlock spruce; recommends open season beginning in middle August prior to altitudinal change.

Barlow, Chester and W. W. Price
1901. Sooty grouse. *In* A list of the land birds of the Placerville-Lake Tahoe stage road. *Condor*, vol. 3, no. 6, p. 160.
Abundance, non-migratory habit, hatching dates, nesting sites and contents, food.

Price, W. W.
1904. Some winter birds of the high Sierras. *Condor*, vol. 6, no. 2, p. 72.
Habitat, altitude, habits.

Mace, B. H.
1916. Nesting of sooty grouse. Calif. Fish and Game, vol. 2, no. 2, p. 110.
Probable relationship between lack of population increase and nesting habits on ground in exposed places.

Dickey, D. R. and A. J. vanRossem
1923. Description of a new grouse from Southern California. *Condor*, vol. 25, no. 5, p. 168-169, 1 tbl.
Description of specimens from Mount Pinos, Kern and Ventura Counties; characteristics, diagnosis, range, hooting sites; names subspecies as *Dendragapus obscurus howardi*, Mount Pinos grouse.

Pemberton, J. R.
1928. The nesting of Howard's grouse. *Condor*, vol. 30, no. 6, p. 347-348, 1 fig.
Description of area; location, poor construction of nest, egg count and description.

deGroot, D. S.
1934. Field observations from Echo Lake, California. *Condor*, vol. 36, no. 1, p. 6-7.
Notes unusual abundance, protective action of hens.

Moffitt, James
1938. The downy young of *Dendragapus*. *The Auk*, vol. 55, no. 4, p. 589-595, 1 fig.
Examination of various specimens to determine differences, description, sexing, measurements; notes essential grayish ventral color as consistent difference from yellowish chicks of *fuliginosus* group.

Stewart, R. E.
1944. Food habits of the blue grouse. *Condor*, vol. 46, no. 3, p. 112-120, 2 figs., 8 tbls.
Report of western states study based on 288 stomach content analyses; distribution, range; winter, spring, early and late summer, fall diets; concludes that great variety from simple winter to complex summer diet; Douglas fir needles comprise 73.2% winter diet; coniferous needles 76.5% spring diet; great variety during early summer with flowers comprising 57.4%, green leaves 24.1%, fruits and seeds 17.3%; late summer fruits and seeds 47.1%, green leaves 31.0%, flowers 15.4%; fall fruit and seeds 45.3%, green leaves 41.7%, flowers 12.7%.

Hoffman, R. S.
1956. Observations on a sooty grouse population at Sage Hen Creek, California. *Condor*, vol. 58, no. 5, p. 321-337, 4 figs., 1 tbl.
Report of investigation of small relatively isolated population to answer some questions regarding taxonomical differences and nature of cyclic fluctuations; description of study area in Nevada County; migration, flocking, breeding behavior, winter behavior, weight class frequency, hooting census, winter roost count, nutritional studies, local variation in crash decline, effect of meadow fertilization; historical evidence for

cyclic nature, modern casual theories; relative abundance of study population, possible synchronous relationship with snowshoe hare population; concludes that study population differs from most previously described populations in having no seasonal altitudinal migration and no flocking behavior; little indication of synchrony between long grouse-hare cycle and short microtine cycle; apparent distinction between ten-year and three-four year cycles; pronounced difference in courting behavior of interior (*obscurus*) group and Pacific coastal (*fuliginosus*) group, apparently correlated with different summer range; population maintained courtship display pattern and breeding habitat preference of *fuliginosus* group.

Note: bibliography, p. 332-334; appendix with references to relative numbers in other western areas, p. 334-337.

Note: initially appeared as "Population fluctuations of small mammals and sooty grouse in California." Univ. Calif., Ph.D. thesis, 161 p., 20 figs., 30 tbls., esp. p. 99-135 (1956). (Typewritten)

WILD TURKEY

Meleagris gallopavo

California. Bureau of Game Management
1931. Turkeys do well. Calif. Fish and Game, vol. 17, no. 4, p. 454-455, 1 fig.
Notation of success of 1930 liberation in Humboldt County with discovery of at least two clutches of young totaling 30 individuals.

Bade, August
1940. The wild turkey. *Calif. Conservationist*, vol. 5, no. 1, p. 9, 23, 1 fig.
Population history and north America transplantings, probable California habitat.

Leopold, A. S.
1943. The molts of young wild and domestic turkeys. *Condor*, vol. 45, no. 4, p. 133-145, 4 figs., 1 tbl.
Report of examination of 194 specimens; postnatal, postjuvenal, first winter, annual and prenuptial molts; retention, replacement, differences in extent; concludes that young undergo three molts before acquiring stable winter plumage; postnatal molt complete; adults undergo two molts yearly.

Leopold, A. S.
1944. The nature of heritable wildness in turkeys. Univ. Calif., Ph.D. thesis, 143 p., 21 figs., 14 tbls. (Typewritten)
Problems of hybridized turkeys, propagation of hybrid birds and survival after liberation, productivity of wild and hybrid populations, flocking habits, mobility of winter flocks, habits, wariness and disturbance tolerance, mating period, nesting, reproductive success, plumage, molts, weights and measurements, secondary sex characters, relative brain and endocrine gland size, environmental adaptation and influences of selective forces; concludes that wild populations wary and shy; breed at favorable season; reproductive success high; tenacious and thrifty populations under adversity readily responsive to protection and management; difficulties in handling confined populations render propagation unprofitable; when hybrid population becomes established, average degree of wildness should increase over a period of generations; recommends deliberate introduction of live-trapped wild gobblers into hybrid populations to hasten genetic rehabilitation.
Note: adaptation appears in *Condor*, vol. 46, no. 4, p. 133-197.

Outdoor California
1950. [Wild turkey releases]. Vol. 11, no. 18, p. 1-3.
Historical account of attempts to establish Merriam species; quail-trading arrangement with Arizona, predatory animal trapping in release areas; range overgrazing, vulnerability of nest and eggs to predation, nest desertion, tendency toward domesticity.

Burger, G. V.
1952. The introduction of wild turkeys in California. Univ. Calif., MA thesis, 91 p., 19 figs., 3 tbls. (Typewritten)
Results of survey to discover success of plants, to determine population size and distribution; methods and materials; history of introduction, localities, numbers, success, factors of failures; notes that 3062 birds and 311 eggs released in 106 plants, four of which successful by 1951; population estimate of 1410-1665, 90% occurring in Cloverdale, Adelaida, Castro Valley Ranch and Brush Creek areas; live oak-grassland interspersions provided with permanent water constitute preferred habitat; future success most probable in Sierra with Merriams.

Burger, G. V.
1954. The status of introduced wild turkeys in California. Calif. Fish and Game, vol. 40, no. 2, p. 123-145, 5 figs., 1 tbl.

Pertinent results of study undertaken to discover survivors and failures of plants, to determine number, distribution and chances for future success; history of plantings 1910-1951; notes that since 1928, 3062 birds and 311 eggs planted; location, cover, dispersal, habitat, age and sex composition of flocks on four successful introductions; game farm hybrids and trapped wild; effects of tameness, predation; concludes that 90% of estimated 1410-1665 population in four successful regions; failure of majority of releases traceable to poor stock rather than to habitat or cover deficiencies; brightest prospects in Sierra with wild Merriam specie, *Meleagris gallopavo merriami.*

HARES AND RABBITS

Black tailed jack *Lepus californicus*
Cottontail *Sylvilagus audubonii*
Brush rabbit *Sylvilagus bachmani*

Bryant, H. C.
1916. Rabbits damage crops in San Diego County. Calif. Fish and Game, vol. 2, no. 4, p. 215-218, 2 figs.
Information resulting from investigation of farmer complaints; tree and vegetable types destroyed, description of area, concentration of rabbits; hunting regulations; recommends use of poisons.

Orr, R. T.
1931. Comparative natural history of central California cottontail and brush rabbits. Univ. Calif., MA thesis, 50 p. (Typewritten)
Geographic distribution, habitat, forms, burrows, runways, seasonal variation in food habits, distance traveled for food, feeding time and method, reproduction, enemies.

Orr, R. T.
1935. Descriptions of three new races of brush rabbit from California. Biol. Soc. Wash., Proc., vol. 48, p. 27-30.
Type, geographic range, diagnosis, measurement of *Sylvilagus bachmani tehamae macrorhinus* and *riparius*.

Davis, W. B.
1936. Young of the brush rabbit, *Sylvilagus bachmani*. Murrelet, vol. 17, no. 2-3, p. 36-40, 2 figs., 4 tbls.
Description of young and nest in Berkeley hills; measurements, coloration, fur; notes nest situation in open, on well-drained slope one-hundred feet from dense chaparral growth.

Orr, R. T.
1937. Systematics and natural history of California hares and rabbits (Family Leporidae). Univ. Calif., PhD. thesis, 302 p., 35 figs. (Typewritten)
Results of 1158 specimens examined representing seven species occurring in California; geographic and sexual variation, type, range, pelege, abnormal coloration, molts, diagnostic key; habitat, feeding habits, reproduction, natural enemies, burrow construction, characteristic poses and movements, effect of grazing.
See especially p. 93-142, 161-280.
Note: adaptation appears as "The rabbits of California," Cal. Acad. Sci., Occas. Papers, No. 19 (1940).

Ingles, L. G.
1941. Natural history observation of the Audubon cottontail. J. Mamm., vol. 22, no. 3, p. 227-250, 5 figs., 2 tbls., 2 pls.
Results of two and one-half year study in Sacramento Valley three miles northeast of Durham; trapping and marking methods and materials; general habits, senses, home range, cover, predation, escape behavior, swimming, parasites and disease, food, breeding behavior, nest description and location, growth, life span; notes that western species differs much in behavior and details of life history from eastern species; concludes that most activity from dusk to dawn in winter months and from 3 pm to 9 pm in other months; female home range about one acre, male as much as fifteen acres; study specimens relatively free from parasites and diseases known to infect cottontails elsewhere; food consists of wild herbaceous plants and fruits; no shrubby plants eaten; practically no damage to flower or vegetable gardens; females compatible, males not; average litter of three with year-round breeding season; life span of two years or less.

Orr, R. T.
1942. Observations on the growth of young brush rabbits. J. Mamm., vol. 23, no. 3, p. 298-302, 1 fig.
Results of eleven-day daily observations on litter in Golden Gate Park, San Francisco; description and location of nests; description and development of five young; reactions to food, light and intrusion; concludes that young born practically naked; fairly well furred at one week; ears open on eighth or ninth day, eyes on tenth or eleventh; definite negative reaction to light; rapid increase in weight; young probably born in open and later carried to nest.

Herman, C. M. and H. A. Jankiewicz
1943. Parasites of cottontail rabbits on the San Joaquin Experimental Range, California. J. Wild. Man., vol. 7, no. 4, p. 395-400, 1 tbl.
Examination of 44 trapped specimens; methods and materials of autopsy; coccidia, experimental studies with *Eimeria stiedae;* nematoda, cestoda.

Fitch, H. S.
1947. Ecology of a cottontail rabbit (*Sylvilagus audubonii*) population in central California. Calif. Fish and Game, vol. 33, no. 3, p. 159-184, 6 figs., 8 tbls.
Data collected during course of wildlife studies at San Joaquin Experimental Range; methods; foraging range, homing, shifts of range, population density and composition, feeding, weights, reproduction; predation by coyote, gray fox, badger, bobcat, red-tailed and Cooper hawk, horned and barn owl, rattle and gopher snakes; disease; estimates predation factors annually consume cottontail weight of 1229 grams per acre; notes ability of population to withstand pressure because of long breeding season and several annual litters; concludes that population trends not materially affected by disease.

Hall, E. R.
1951. A synopsis of the North American Lagomorpha. Univ. Kansas Publ., Mus. Nat. Hist., vol. 5, no. 10, p. 119-202, 68 figs.
Description, range and distribution, marginal records.
See especially p. 144-146, 161-166, 181-186.

Mossman, A. S.
1951. A study of reproduction in *Sylvilagus bachmani.* Univ. Calif., MA thesis, 17 p., 4 figs., 1 tbl. (Typewritten)
Study made in anticipation of increased hunter interest; methods and materials; length of breeding season, infertility periods, gestation, induced ovulation, embryonic development, reproduction potential, sex ratios, description and location of nest; concludes November-June breeding capability with January-May peak; infertility period coincides with dry season in central western California; gestation period of about 27 + three days, with possibility of three or four litters per season; first breeding in spring following birth; probable sex ratio of 88.0:100 male to female.
Note: adaptation appears in J. Wild. Man., vol. 19, no. 2, p. 177-184 (1955).

Biswell, H. H. and others
1952. Management of chamise brushlands for game in the north coast region of California. Calif. Fish and Game, vol. 38, no. 4, p. 453-484, 19 figs., 4 tbls.; especially p. 464.
Progress report of 1948-1951 investigation mainly in Lake County to determine whether game populations build up under brushland management and most satisfactory way to manipulate cover to increase production; description of areas, vegetation, soils, climate, land management pattern; burning, grazing, control of sprouts, mechanical and chemical control of brush, reseeding; density of populations, effect of wildfire burns and opening brush.

Connell, J. H.
1953. Home range and mobility of brush rabbits in California chaparral. Univ. Calif., MA thesis, 40 p., 8 figs., 2 tbls. (Typewritten)
Description of study area in Berkeley hills southeast of campus; validity of trapping and marking methods; vegetation, brush, cover, water; pellet census, habitat preference, day-to-day movements, individual range measurements, breeding season, population size, weight changes, parasites; concludes that home ranges centered about forty feet inside brush edge; winter foraging movements at least seventy feet from brush; males moved more freely than females; 2.3 rabbits per acre fall population density, 0.9 per acre spring density; breeding season peak in April.
Note: adaptation appears in J. Mamm., vol. 35, no. 3, p. 392-405 (1954).

Leach, H. R. and W. H. Frazier
1953. A study of the possible extent of predation on heavy concentrations of valley quail with special reference to the bobcat. Calif. Fish and Game, vol. 39, no. 4, p. 527-538, 3 figs., 4 tbls.

Results of predator stomach analyses to determine vulnerability of birds in areas of "gallinaceous guzzlers"; description of study area in southeastern corner of Temblor Range; list of predators and prey; concludes that staple food of coyote and bobcat consists of rodents and lagomorphs.

Lechleitner, R. R.
1956. The black-tailed jack rabbit on the Gray Lodge Waterfowl Area, California. Univ. Calif., Ph. D. thesis, 161 p., 12 figs., 18 tbls., 2 pls. (Typewritten)

Description of study area and two-year program; trapping and marking methods and materials; sex and age ratios, reproduction, home range and movements, population density, mortality, social organization and behaviorisms; concludes 50:50 pre- and post-natal sex ratio; population turnover within about five years; young able to breed at eight months; suggestion that nutrition plays major role in breeding activity; great prenatal mortality; well-defined home ranges of 30-55 acres with considerable overlap; shifting, expansion and contraction of ranges caused by pattern of food, water and cover; greatest loss in winter, mainly by "shock disease."

Lechleitner, R. R.
1957. Reingestion in the black-tailed jack rabbit. J. Mamm., vol. 38, no. 4, p. 481-485, 1 fig.

Description and rhythm of reingestion of soft fecal pellets; notes process as normal part of feeding biology on Gray Lodge Management Area.

WESTERN GRAY SQUIRREL

Sciurus griseus

Stanley, A. J.
1916. Grey squirrel in the Plumas National Forest. Calif. Fish and Game, vol. 2, no. 2, p. 112.
Increase in population and depredation of pine and fir cones, 1913 disease effect on decreased hunt.

Bryant, H. C.
1921. Tree squirrels infested with scabies. Calif. Fish and Game, vol. 7, no. 2, p. 128.
Notes El Dorado National Forest epidemic and subsequent extermination; description of diseased specimens, effects of disease, possible treatment.

Storer, T. I.
1922. The young of the California gray squirrel. J. Mamm., vol. 3, no. 3, p. 188-189.
Nest location, construction and description; young removal to laboratory, feeding experiments and habits; description of young.

Merriam, C. H.
1930. A nest of the California gray squirrel (*Sciurus griseus*). J. Mamm., vol. 11, no. 4, p. 494, 1 pl.
Habitat and nest description.

Ross, R. C.
1930. California *Sciuridae* in captivity. J. Mamm., vol. 11, no. 1, p. 76-78.
Notes Jamestown instance of two eleven-year-old individuals; habits in enclosure.

Fritz, Emanuel
1932. Squirrel damage to young redwood trees. J. Mamm., vol. 13, no. 1, p. 76.
Description of bark stripping action, effect on trees, possible effect of protective hunting legislation.

Ingles, L. G.
1947. Ecology and life history of the California gray squirrel. Calif. Fish and Game, vol. 33, no. 3, p. 139-158, 7 figs., 3 tbls.
Presentation of data gathered principally in Butte County, November 1940-July 1946; description of area, methods; activity, behavior, response to weather, material contribution to reforestation, slight fire hazard of kitchen middens; competitors, especially Acorn woodpecker; notes comparative lack of predators; parasites and diseases, food, breeding, nests, development and growth of young, home range and territory, population estimate, economic status, suggestions for habitat improvement.

FUR-BEARERS

GENERAL

Bryant, H. C.

1915. California's fur-bearing mammals. Calif. Fish and Game, vol. 1, no. 3, p. 96-107, 2 figs.

Review of historical works mentioning abundance, demand, early fur trade, fur farm development; recommendations for meeting decrease in numbers.

Dixon, Joseph

1925. Food predilections of predatory and fur-bearing mammals. J. Mamm., vol. 6, no. 1, p. 34-46, 10 figs., 1 tbl., 1 pl.

Methods and materials of stomach analyses, identification of remains, food items by percentage and bulk.

Orr, R. T.

1949. Mammals of Lake Tahoe. Calif. Acad. Sci., figs. in text.

History and description of region; classification and key to species, description, general and local distribution, abundance, food and breeding habits, development of young, productivity, predation, enemies.

Note: black bear, p. 29-32; coyote, p. 58-60; mountain lion, p. 61-64; muskrat, p. 100-101; beaver, p. 102-104.

CALIFORNIA MOUNTAIN LION

Felis concolor californica

Bryant, H. C.

1917. Mountain lion hunting in California. Calif. Fish and Game, vol. 3, no. 4, p. 160-166, 6 figs.

Predation and need for increased bounty system; shooting, trapping, tracking; habits, habitat, abundance.

Bruce, J. C.

1918. Lioness tracked to lair. Calif. Fish and Game, vol. 4, no. 3, p. 152-153, 3 figs.

Description of lair, nesting habits.

Hunter, J. S.

1921. The control of the mountain lion in California. Calif. Fish and Game, vol. 7, no. 2, p. 99-101, 1 fig., 1 tbl.

History of bounty system 1907-1919; destructiveness of lion; calculation of 1921 population: 575.

Bruce, Jay

1925. The problem of mountain lion control in California. Calif. Fish and Game, vol. 11, no. 1, p. 1-17, 5 figs.

Bounty system, distribution, estimated population, predation; breeding, development and size; methods of hunting and trapping.

Grinnell, Joseph, J. S. Dixon and J. M. Linsdale

1937. Mountain lions. *In* Fur-bearing mammals of California. Univ. Calif. Press, p. 533-589, 25 figs., 6 tbls.

General characteristics, descriptions, weights and measurements, type locality, distribution and range, habitat, feeding habits, breeding, gestation, productivity, development of young, den location and description, hunting and bounty system.

McLean, D. D.
1954. Mountain lions in California. Calif. Fish and Game, vol. 40, no. 2, p. 147-166, 1 fig., 2 tbls.
Status, life history observations and 44-year kill record; description, breeding period, kittens, production, mortality, disease, parasites, range, food and general habits; domestication, bounty system, control; necessity of maintaining predator-prey relationship with deer populations.

McMillin, Mark
1955. The California mountain lion. *Frontiers*, vol. 19, no. 4, p. 109-111, 1 fig.
Description, measurements, distribution, range, relationships with burros, porcupines, deer; mating, gestation, productivity, development of young; bounty system.

COYOTE

Mountain Canis latrans lestes
California valley C. l. ochropus
Desert C. l. estor

Dixon, J. S.

1920. Control of the coyote in California. Univ. Calif., Coll. Agr., Exp. Sta., Bull. 320, p. 379-397, 7 figs.

Economic status, extent and nature of damage, value of species to state, food and feeding habits, breeding, location and description of den, methods of destruction, bounty system; concludes that bounty system expensive, productive of endless fraud and no general or permanent relief.

Hall, E. R.

1931. The coyote and his control. Calif. Fish and Game, vol. 17, no. 3, p. 283-290, 1 fig.

Virtues and faults; methods of control; reproduction and adaptability.

Grinnell, Joseph, J. S. Dixon and J. M. Linsdale

1937. Coyotes. *In* Fur-bearing mammals of California. Univ. Calif. Press, p. 472-525, 23 figs., 7 tbls., 1 color plate.

General characteristics, descriptions, distribution, weight and measurements, type locality of mountain (*Canis latrans lestes* Merriam), California valley (*C. l. ochropus* Escholtz) and desert (*C. l. estor* Merriam) races; feeding habits, mating, gestation, average litter, development of young, den description and location, predator-prey relationships, diseases.

Bond, R. M.

1939. Coyote food habits on the Lava Beds National Monument. J. Wild. Man., vol. 3, no. 3, p. 181-198, 3 figs., 2 tbls.

Results of examining 273 droppings and nine stomachs 1935-1937, representing every month except February, partially to determine effect of population on adjacent Tule Lake Waterfowl Refuge populations; description of area in Modoc and Siskiyou Counties, methods and materials; identity of food items, percentage of occurrence in scats; number of coyotes, effect on prey species, distribution and abundance of prey species, economic evaluation of predation, notes certain limitations of materials; concludes large probable amount of carrion food; no evidence to suggest necessity or advisability to control coyote.

Darby, R. E.

1947. Food habits of the coyote (*Canis latrans*) in the north central Sierra Nevada region of California. Univ. Calif., MA thesis, 118 p., 5 figs., 11 tbls. (Typewritten)

Results of laboratory examination and 687 stomach content analyses; methods and materials; food consumed; animal, bird, invertebrate and vegetable categories; seasonal and life-zone comparisons; concludes that animal matter constituted 93.7% volume; mammals provided bulk of animal matter, with squirrels (*Citellus*) most important, rabbits second, carrion meat third and deer fourth; no conclusive statements regarding deer-coyote relationship based on evidence gathered.

Ferrel, C. M., H. R. Leach and D. F. Tillotson

1953. Food habits of the coyote in California. Calif. Fish and Game, vol. 39, no. 3, p. 301-341, 19 figs., 5 tbls.

Results of eleven-year collection and analysis of 3982 stomachs in effort to understand role of species in relation to environment; techniques, methods, materials, personnel used; regional and seasonal groupings of data; description of region, identification and percentage of food items; emphasizes that stomach analysis no direct telling of net effect of predation on prey, that presence of food item not indicative of circumstances under which eaten, and that important role of carrion not recognized by examination of stomach contents; effect on predator food habits of availability and abundance of prey species due to cyclic and seasonal phenomena; beneficial role in northeast region as porcupine predator and relationship to silviculture practices; difficulty of interpretation of deer remains because of "statistical carrion" factor; livestock taken largely

as carrion; game birds as surprisingly small percent of diet; role as unequaled scavenger; concludes that rodents constitute 26.5% of all food items, rabbit 23.3%, deer 13.8%, horse and cow 11.1%, sheep 7.2%, birds 4.6%, vegetable 4.0%.

Leach, H. R. and W. H. Frazier

1953. A study of the possible extent of predation on heavy concentrations of valley quail with special reference to the bobcat. Calif. Fish and Game, vol. 39, no. 4, p. 527-538, 3 figs., 4 tbls.

Results of predator stomach analyses to determine vulnerability of birds in areas of "gallinaceous guzzlers"; description of study area in southeastern corner of Temblor Range; list of predators and prey; concludes that staple food of coyote consists of rodents and lagomorphs; no evidence to support widely accepted belief that ground predators prey heavily on adult quail.

BLACK BEAR

Sierra Nevada *Ursus americanus californiensis*
Northwestern *U. a. altifrontalis*

Bruce, Jay
1923. The black bear in relation to stock. Calif. Fish and Game, vol. 9, no. 1, p. 16-18.
Investigation by State Lion Hunter into stockmen's charges relative to bear's alleged destructiveness; incidental notes on diet and habits; concludes that mountain lion or coyote responsible for every instance where bear accused of killing sheep or cattle.

Grinnell, Joseph
1929. The two races of black bear in California. Univ. Calif. Publ. Zool., vol. 32, no. 3, p. 395-408, 3 pls.
Diagnostic characteristics of Sierra Nevada and Northwestern subspecies, distribution and range, nomenclature, variations.

Poole, C. G.
1930. An analysis of the bear question. Calif. Dept. Agri., Monthly Bull., vol. 19, no. 1, p. 61-63.
Economic status, feeding habits, stockmen and conservationist attitudes; concludes that bear not stock killer.

Grinnell, Joseph, J. S. Dixon and J. M. Linsdale
1937. Black bears. *In* Fur-bearing mammals of California. Univ. Calif. Press, p. 95-136, 22 figs., 2 tbls.
Characteristics, historical distribution, description, type locality; color phases, hibernation, breeding, gestation period, birth and development of young, feeding habits; population estimates.

Beatty, M. E.
1943. Bears of Yosemite. *Yosemite Nature Notes*, vol. 22, no. 1, p. 1-16, 12 figs.
Range and numbers, color phases, size and life span, hibernation, location and description of dens, breeding data, food habits.

Outdoor California
1947. So you want to go bear hunting? Vol. 8, no. 36, p. 1-3.
Abundance, description, weight, color phases; injury to hunters, hunting seasons and areas; notes possible trichinosis in meat.
Note: reprinted in *Donner Trail Reporter*, vol. 1, no. 13, p. 1-2 (1950).

Lynn, Al
1950. The bear of California. *Donner Trail Reporter*, vol. 1, no. 13, p. 1, 8.
Distribution, range, color phases, feeding habits; dormant period, location and description of dens; mating, gestation period, birth and growth of cubs; hunting seasons; notes that young usually born in January, average litter of two; breed first at three years of age, producing cubs in alternate years only.

RING-TAILED CAT

California Bassariscus astutus raptor
San Diego B. a. octavus
Nevada B. a. nevadensis

Fry, Walter
1926. The California ring-tailed cat. Calif. Fish and Game, vol. 12, no. 2, p. 77-78.
Description, range and distribution, habits and habitats; breeding season; domesticating experience in Sequoia National Park; need for protective legislation.

Grinnell, Joseph, J. S. Dixon and J. M. Linsdale
1937. California ring-tailed cat. *In* Fur-bearing mammals of California. Univ. Calif. Press, p. 166-183, 9 figs., 2 tbls.
General characteristics, descriptions, color variations, weights and measurements, type localities, distribution, range, habitat, feeding habits, mating, litter average, development of young; experiences with individuals in captivity; notes practical impossibility of extinction; use of fur.

Naylor, A. E. and G. W. Wilson
1956. Unusual occurrence of the ring-tailed cat. Calif. Fish and Game, vol. 42, no. 3, p. 231.
Notes appropriation of wood duck boxes for denning sites northeast of Colusa, outside typical habitat.

BEAVER

Golden *Castor canadensis subauratus*
Shasta *C. c. shastensis*
Sonora *C. c. frondator*

Taylor, W. P.
1912. The beaver of west central California. Univ. Calif. Publ., Zool., vol. 10, no. 7, p. 167-169.
Description of new golden species from confluence of Tuolumne and San Joaquin Rivers region; general characters, color, skull and tail dimensions; notes probable extinction without protection.

Bryant, H. C.
1915. Thriving beaver colonies near Mendota, Fresno County, California. Calif. Fish and Game, vol. 1, no. 5, p. 236, 1 fig.
Notes results of 1911 total protection measure.

Brown, W. S.
1916. Beaver on the increase in Madera County. Calif. Fish and Game, vol. 2, no. 3, p. 163.
Notes effects of protective laws.

Taylor, W. P.
1916. The status of the beavers of western North America, with a consideration of the factors in their speciation. Univ. Calif. Publ., Zool., vol. 12, no. 15, p. 413-495.
Nomenclature, external and cranial characters, new species description, comparison of species; history and relationships, isolation and speciation, measurements, coloration and pelage, dentition; notes that California stock has undergone greatest divergence.

Holden, F. H.
1917. Osteological relationships of three species of beavers. Univ. Calif. Publ., Zool., vol. 17, no. 8, p. 75-114, 18 figs., 8 pls.
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1922. Rodents and reclamation in the Imperial Valley. J. Mamm., vol. 3, no. 3, p. 136-146.
Effect of reclamation, irrigation and other human activity; population estimates, former abundance, protective legislation.

Neale, George
1924. The future of the beaver. Calif. Fish and Game, vol. 10, no. 3, p. 114-150.
Effect of reclamation and open season on population; operations of Plumas County State Beaver Farm.

Grinnell, Joseph, J. S. Dixon and J. M. Linsdale
1937. Beaver. *In* Fur-bearing mammals of California. Univ. Calif. Press, p. 629-727, 64 figs., 5 tbls.
General characters, descriptions, color variations, weight and measurements, type locality, distribution, range; history of fur trade and plantings; dam construction, effects on other wildlife, fish, livestock, subirrigation, levees and streams; swimming and feeding habits; description of houses and burrows; scenting, mating, breeding, gestation, productivity, sex ratio, development of young; rearing in captivity; disease, parasites, lack of natural enemies, recuperative powers of populations.

Tappe, D. T.
1942. The status of beavers in California. Calif. Div. Fish and Game, Game Bull. 3, 59 p., 26 figs.
History of Shasta, golden and Sonora species; former range, introduction of other species, quest for pelts, legislation; location and description of colonies, importance of dams and burrow to water table, irrigation, holding ponds, summer flow, erosion; history and location of plants; recommends reestablishing three native races over former range where practical; removal of goldens from delta region.

Twining, Howard
1942a. Bringing back the beaver. Sierra Club Bull., vol. 27, no. 4, p. 116-118.
Historic distribution, transplanting work, habitat requirements, effect of trout, fur value.

Twining, Howard
1942b. [Transplanting beaver in California.] *Outdoor California*, vol. 2, no. 39, p. 1-3
Historical distribution, trapping efforts and protective legislation; transplanting experiments.

Hensley, A. L.
1946. A progress report on beaver management in California. Calif. Fish and Game, vol. 32, no. 2, p. 87-99, 7 figs., 1 tbl.
Brief review of history and status of population and discussion of management plans; legislation, investigations, transplantings.

Hensley, A. L. and B. C. Fox
1948. Experiments on the management of the Colorado River beaver. Calif. Fish and Game, vol. 34, no. 3, p. 115-131, 12 figs., 5 tbls.
Record of preliminary findings of cooperative program between California and Arizona to determine population density and to evaluate effect of cropping; methods, management, trapping, curing, marketing procedures; disease study.

Lynn, Al
1951. The beaver of California. *Donner Trail Reporter*, vol. 2, no. 3, p. 13, 2 figs.
History of economic value, transplanting efforts, fur value.

Wallis, O. L.
1951. Yosemite beavers as of today. *Yosemite Nature Notes*, vol. 30, no. 1, p. 5-9, 2 figs.
Habits, habitat, establishment of populations, description and construction of dams, flood damage to ponds.

Hall, J. G.
1956. Willow and aspen in the ecology of beaver on Sagehen Creek, California. Univ. Calif., Ph.D. thesis, 88 p., 23 figs., 5 tbls. (Processed)
Results of four-year study to examine and compare utilization in colonies where supplies strikingly different; description and location of study area, distribution of woody cover, description of colonies; population size, action and behavior; trapping and marking methods and materials; effect of population on other wildlife; concludes that aspen cut as long as available; aspen supply constantly diminishing primarily because of beaver cutting, secondarily because sheep killing new sprouts; willow cutting exceeded growth; local exhaustion of willow will shift beaver to adjacent sites on rotational sustained yield; stability of beaver at considerably below peak will follow aspen elimination.

MUSKRAT

Colorado River *Ondatra zibethica bernardi*
Nevada O. z. *mergens*

Dixon, J. S.
1922. Rodents and reclamation in the Imperial Valley. J. Mamm., vol. 3, no. 3, p. 136-146.
Effect of reclamation, irrigation and other human activity; population estimates, breeding, development of young, feeding habits.

Grinnell, Joseph, J. S. Dixon and J. M. Linsdale
1937. Muskrats. *In* Fur-bearing mammals of California. Univ. Calif. Press, p. 728-763, 13 figs., 4 tbls., 1 color pl.
General characters, descriptions, color variations, weights and measurements, distribution and range, burrow construction, breeding, gestation, productivity, sex ratio, population estimates, effect on levees and ditches, fur-farming potentials.

Storer, T. I.
1938. The muskrat as native and alien: a chapter in the history of animal acclimatization. Calif. Fish and Game, vol. 24, no. 2, p. 159-175, 4 figs.
Original distribution, transplantation, European spread; California translocation, extension of habitat, demand for pelts, damage to drainage canals, attempts at eradication, breeding potentials.
Note: reprinted with changes from J. Mamm., vol. 18, no. 4, p. 443-460 (1937).

Twining, Howard and A. L. Hensley
1943. The distribution of muskrats in California. Calif. Fish and Game, vol. 29, no. 2, p. 64-78, 4 figs.
Original distribution, increased importance as fur bearer, spread and introduction, reported catch 1919-1942, history by county.

Hensley, A. L. and Howard Twining
1946. Some early summer observations on muskrats in a Northeastern California marsh. Calif. Fish and Game, vol. 32, no. 4, p. 171-181, 5 figs.
Results of survey of Gooch Swamp in Lassen County as part of wildlife restoration project 5R; notes 1931-1933 escape from Mt. Shasta Fur Farm and invasion into Pit River watershed marshes; fur and damage significance to economy; description of area, methods, marking of individuals; house construction, mating, care of young, growth, enemies.

Seymour, G. D.
1954. Recent extension of the range of muskrats in California. Calif. Fish and Game, vol. 40, no. 4, p. 375-384, 4 figs., 2 tbls.
Status as most important fur bearer in state in numbers and value; range extension in Imperial Valley; history of restrictive legislation; catch records by county of licensed trappers, 1939-1953; damage to farm irrigation systems; notes that Sacramento Valley damage to check levees and headgates blamed on muskrats actually work of Norway rat; estimates value of 1952-53 season at $83,000 representing 83,053 individuals.

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ASSEMBLY INTERIM COMMITTEE REPORTS

VOLUME 5 NUMBER 6

1957-59

FINAL REPORT

of the

ASSEMBLY INTERIM COMMITTEE ON FISH AND GAME

To the California Legislature
(House Resolution 210, 1957)

MEMBERS OF THE COMMITTEE

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PAULINE L. DAVIS, Vice Chairman

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EUGENE G. NISBET
ALAN G. PATTEE
JACK SCHRADE
VINCENT THOMAS

February 5, 1959

Published by the
ASSEMBLY
OF THE STATE OF CALIFORNIA

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Speaker

HON. CARLOS BEE
Speaker pro Tempore

HON. WILLIAM A. MUNNELL
Majority Floor Leader

HON. JOSEPH C. SHELL
Minority Floor Leader

ARTHUR A. OHNIMUS
Chief Clerk

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LETTER OF TRANSMITTAL

Assembly Interim Committee on Fish and Game

February 5, 1959

HON. RALPH M. BROWN
Speaker of the Assembly; and

HON. MEMBERS OF THE ASSEMBLY
State Capitol, Sacramento, California

LADIES AND GENTLEMEN: In accordance with the provisions of House Resolution No. 210 of the 1957 General Session, your Committee has reviewed various aspects of the California fish and game management program and herewith submits the final report of its activities during the interim following the close of the 1957 Session.

Contained herein are narratives of the committee's field trips, reviews of testimony received at its various hearings and committee findings and recommendations.

The committee wishes to express its appreciation for assistance rendered by members of the staff of the Legislative Analyst and to its research assistant, William F. Scheuermann, Jr., for field investigations and the writing of this report.

Respectfully submitted,

FRANK P. BELOTTI, *Chairman*
PAULINE L. DAVIS, *Vice Chairman*
(accepted in part)

Don Allen, Sr.
Montivel A. Burke
Lou Cusanovich
Myron H. Frew
William S. Grant
Seth J. Johnson
Eugene G. Nisbet
Alan G. Pattee
Jack Schrade

2—L-3467

HOUSE RESOLUTION NO. 210 (1957)

Relative to constituting the Assembly Standing Committee on Fishing and Game an interim Committee

Resolved by the Assembly of the State of California, as follows:

1. The Assembly Standing Committee on Fish and Game of the 1957 Regular Session is hereby constituted an interim committee and is authorized and directed to ascertain, study and analyze all facts relating to the propagation, protection, and taking by sportsmen and commercial interests of fish and game, including, but not limited to game farms, game areas and management areas, game refuges, fish hatcheries, the opening and closing of waters around Catalina Island and in other areas, netting in the inland waters of the State, the utilization of the public domain for the propagation of fish and game, the effect of the taking of fish and game by sportsmen and commercial interests on future generations of citizens, and all other matters directly or indirectly dealing with, related to, or affecting fish and game or the enjoyment by the people of their constitutionally guaranteed interest therein, including but not limited to the operation, effect, administration, enforcement and needed revision of any and all laws in any bearing upon or relating to the subject of this resolution, and to report thereon to the Assembly, including in the reports its recommendations for appropriate legislation.

2. The committee shall consist of the members of the Assembly Standing Committee on Fish and Game for the 1957 Regular Session. The chairman and vice chairman shall be the chairman and vice chairman of the standing committee. Vacancies occurring in the membership of the committee shall be filled by the appointing power.

3. The committee is authorized to act during this session of the Legislature, including any recess, and after final adjournment until the commencement of the 1959 Regular Session, with authority to file its final report not later than the fifth legislative day after the constitutional recess during such session.

4. The committee and its members shall have and exercise all of the rights, duties and powers conferred upon investigating committees and their members by the provisions of the Joint Rules of the Senate and Assembly and of the Standing Rules of the Assembly as they are adopted and amended from time to time at this session, which provisions are incorporated herein and made applicable to this committee and its members.

5. The committee has the following additional powers and duties:

(a) To contract with such other agencies, public or private, as it deems necessary for the rendition and affording of such services, facilities, studies and reports to the committee as will best assist it to carry out the purposes for which it is created.

(b) To co-operate with and secure the co-operation of county, city, city and county, and other local law enforcement agencies in investi-

gating any matter within the scope of this resolution and to direct the sheriff of any county to serve subpoenas, orders and other process issued by the committee.

(c) To report its findings and recommendations to the Legislature and to the people from time to time and at any time, not later than herein provided.

(d) To do any and all other things necessary or convenient to enable it fully and adequately to exercise its powers, perform its duties, and accomplish the objects and purposes of this resolution.

6. The sum of twenty-six thousand dollars ($26,000) or so much thereof as may be necessary is hereby made available from the Contingent Fund of the Assembly for the expenses of the committee and its members and for any charges, expenses or claims it may incur under this resolution, to be paid from the said Contingent Fund and disbursed, after certification by the chairman of the committee, upon warrants drawn by the State Controller upon the State Treasurer.

PREFACE

This committee, recognizing the increasing pressures on California's fish and game resources and appreciating its own responsibilities in this particular area, undertook during the 1957-1959 interim period a program of investigation designed to provide a sound basis for positive legislative proposals for the continued protection and sustained yield of those resources.

Toward these ends, the committee sincerely endeavored to enlist the aid, knowledge, and counsel of those people most directly concerned with the perpetuation of the State's wildlife—the Department of Fish and Game, conservation groups, organized and unattached sportsmen and the commercial fishing industry. These factions and the general public were invited to attend and participate in the following hearings held by the committee: Redding, August 12, 1957; Susanville, August 13, 1957; San Diego, October 2, 1957; San Pedro, October 4, 1957; Visalia, December 5, 1957; Eureka, January 27, 1958; Fort Bragg, November 13, 1958; Eureka, November 14, 1958; and San Pedro, November 24-25, 1958.

What follows in the text of this report are excerpts of testimony presented to the committee at these hearings and the committee recommendations based upon that testimony. The appendix contains proposed legislation implementing these recommendations.

SUMMARY OF RECOMMENDATIONS

Abalone

(1) Continuation of the prohibition against commercial abalone fishing north of Point Lobos;

(2) Amendment of the Fish and Game Code to change the 20-foot minimum depth requirement for commercial operations to a permanent 150-foot offshore provision;

(3) Amendment of the Fish and Game Code to provide a temporary two-year relaxation of the minimum size limit on red abalone in any area south of Santa Barbara.

Anchovy

A flexible maximum tonnage limitation to be determined by the Department of Fish and Game, effective April, 1960.

Sardine

Retention of current seasonal requirements.

Tuna

Adoption of a resolution requesting the appropriate Congressional committee to hold a hearing in the San Diego area specifically on the tuna import situation and its effects on the California tuna fleet.

Deer

Renewal for a two-year period of the provisions of the so-called "Busch Bill."

Doves

Retention of the mourning dove as a game bird in California.

Pheasants

Termination of the "put-and-take" management program and retention of the pheasant tag system.

Water Pollution

Initiation of a comprehensive water pollution study in the San Francisco Bay area and in the Sacramento River.

Disposal of Dead Sea Mammals

Permission to use either the Fish and Game Preservation Fund or county fish and game fine money for disposing of sea mammals that wash ashore on public beaches.

Federal Military Closures

Adoption of a resolution urging the United States Government to hold public hearings prior to the closing of any coastal area to fishing.

SUBJECTS OF INVESTIGATIONS AND FINDINGS

MARINE FISHERIES

ABALONE

Testimony during the interim indicates that this resource is as stable as any California fishery and that it is very productive. It was pointed out that this is one specie that reacts favorably to continued harvest under regulation to produce a better fishery.

The bulk of the commercial activity is in the Morro Bay area and southern California offshore islands while the sport fishery centers along southern California and north coastal mainland waters. Commercial fishing for abalone is currently prohibited north of Point Lobos. The red abalone is the specie found in fishable quantities north of San Miguel Island and the pink is found around the other channel and offshore islands that support the commercial industry.

A continuing proposal by the Northern California Seafood Institute has been one that would open certain areas of the north coastal region to commercial fishing of these mollusks. From testimony gathered on field trips, it is evident that the great majority of people living in these areas are unalterably opposed to commercialization of the north coast abalone resource. It was further evident that the economy of the area is considered to be enhanced more by the sport fishery than would be the case if commercial abalone fishing were permitted. In addition, a 1955 Department of Fish and Game study yielded the result that no area which had been studied in the north coast region could support a commercial abalone fishery.

Sections 8308-8316 of the Fish and Game Code expired 91 days after the adjournment of the 1957 Legislature, but Assembly Bill No. 3704 (Johnson) embodied the language of these sections and was referred to committee for interim study. This bill would prohibit commercial abalone fishing in some southern California waters and would require any commercial activity to stay at least 150 feet from shore while fishing for abalone.

The previous code sections represented a compromise between certain commercial divers and some sportsmen and was aimed primarily at avoiding friction between them rather than at conservation of the resource. Testimony revealed that a previous fishing depth limitation of 20 feet was difficult to comply with and to enforce, but that the 150-foot range would be more adequate. It was further revealed that the amount of commercial fishing along the southern California mainland was such that closures had no real effect on the abalone resource.

During committee hearings in the San Diego area, the observation was made that size restrictions on the red abalone in that region ought to be relaxed temporarily. Mature specimens of the red variety are evidently abundant in the San Diego area at depths ranging between 50 and 90 feet, but most of them are old and their dark meat has

little market value. Because of crowded conditions many of these abalone apparently do not attain the eight-inch minimum size limit for commercial taking. By temporarily relaxing the size limit on this specie in this area, it was felt that more of the mature but undersized abalone might be taken, allowing more space for the young abalone to grow, thereby improving the quality and size of the fishery. The Department of Fish and Game testified that a relaxation of size limits on the red abalone in all southern California waters might be appropriate.

Findings

(1) There is much public opposition to commercial abalone fishing in the north coastal area and there is some scientific evidence that the area could not support a commercial operation;

(2) Sections 8308-8316 of the Fish and Game Code were adopted on a two-year trial period for reasons other than conservation;

(3) The 150-foot offshore provision for commercial operations is more adequate for reasons of enforcement and compliance than the previous 20-foot depth requirement;

(4) Relaxing of the minimum commercial size limit for red abalones in southern California would meet with industry and departmental approval.

Recommendations

(1) Continuation of the prohibition against commercial abalone fishing north of Point Lobos;

(2) Amendment of the Fish and Game Code to change the 20-foot minimum depth requirement for commercial operations to a permanent 150-foot offshore provision;

(3) Amendment of the Fish and Game Code to provide a temporary two-year relaxation of the minimum commercial size limit on red abalone in any area south of Santa Barbara.

NOTE: No further legislation is required regarding recommendation (1). Proposed legislation implementing recommendation (2) appears as Appendix A and was introduced January 7, 1959, as Assembly Bill No. 69 by Messrs. Belotti and McCollister by request of this committee. Proposed legislation implementing recommendation (3) appears as Appendix B and was introduced January 7, 1959, as Assembly Bill No. 90 by Messrs. Nisbet, Grant and Belotti by request of this committee.

ANCHOVY

In the last few years, the anchovy catch and the amount of spawning have been on the increase.

On airplane spotting flights and ground surveys during 1958, more schools of anchovy were spotted than ever before. On this basis, the Department of Fish and Game reports that this specie could support a fishery in the central California region, whereas in the past the department's outlook for an increased anchovy fishery has been pessimistic in nature. It has been estimated further that the lower three-quarters of the heavy spawning area which is in Baja California waters is virtually unfished.

It would seem, then, that the anchovy population is actually in a healthy state. Currently, this short-lived fish is the one upon which

the bait fishery for sport boats is dependent and it is also the subject of a minor commercial canning fishery.

The sports fishermen's representative has asked for a 25,000-ton bag limit on the commercial catch and the fish canners' association sees no useful result from the imposition of such a bag limit. Currently, the Fish and Game Code places no limitation on the total catch south of Point Mugu. A 35,000-ton limit was in effect on the commercial total from April, 1955, through March, 1957, a provision enacted with the approval of the commercial fishing industry inasmuch as there was not sufficient information at that time to indicate the effect of a bag limit on the anchovy population.

Department of Fish and Game biologists suggest that the correct harvesting of anchovies should not be based on a statutory bag limit, but rather on maximum limits flexible enough to take advantage of the numbers of fish actually in California waters during any given year. For example, if spotting surveys indicate that a certain tonnage could be taken without damaging the resource, the biologists feel that a bag limit providing for less than the potential harvest would be unwise; conversely, if a statutory limit allowed a total catch larger than the fishery's potential, an adverse effect on the resource could result.

Findings

This committee feels that the industry should be allowed to harvest as many anchovy as possible without causing irreparable damage to the population and that any tonnage limitation should reflect the condition of the resource based upon population estimates and landing trends.

Recommendations

(1) That a maximum flexible tonnage limitation be applied to the commercial take from April, 1960-March, 1963;

(2) That the Department of Fish and Game shall recommend this seasonal limitation based upon regular airplane spotting flights and ground surveys of the anchovy schools;

(3) That the department shall estimate from current landing trends the prospective date on which the seasonal quota will be reached and shall recommend that date as the closing date for the season.

In essence, then, the committee recommends renewal of Sections 8183-8187 of the Fish and Game Code, the bag limit figure to be recommended by the department.

SARDINES

During the last few years, sardines have made a "limited comeback" in California waters. The various state and federal agencies that have been carefully watching this pelagic specie point out that although there has been an increase in numbers and in the fishery, the current abundance does not approach to any degree the magnitude of the fishery prior to the "disappearance" of the sardine. But, several canneries in the Monterey area have reopened and are operating at the present time.

Just as the disappearance of this once-important fish has never been explained satisfactorily by any research group, there has been no conclusive evidence for the basis of its return. California fishery biologists

have reason to believe, however, that there seems to be a direct relationship between the abundance of this specie and others, and the warm-cold offshore water current cycles. The sardines have increased in abundance as the water has increased in temperature. In addition, numerous small sardines have been taken during 1958 primarily as a result of an unusual close-to-shore spawn.

With an increase in sardine abundance, recommendations aimed at controlling the renewed fishery were to be expected. The ILWU Fisherman's Union, for example, has recommended elimination of the bait fishery for sardines and establishment of a statewide uniform fishing season. This group would support a uniform season even if it were shortened to the period September 1st-December 1st, although this group feels that the current season is adequate.

An AFL-CIO representative testified that his organization would support a uniform statewide season if the sardines were ready for canning in all areas of the State at the same time. This group feels that current legislation is adequate regarding seasons.

Existing legislation provides for a seasonal difference between northern and southern areas based on the readiness of the sardine for canning. The season in effect at the present time is based on a voluntary proposal by the fishermen themselves, permitting a northern catch between August 1st and December 31st, and a southern catch between September 1st and December 31st.

Testimony from the Fish and Game Department indicates that no change in existing legislation is necessary regarding the sardines.

Findings

Current seasons are adequate and generally accepted as valid.

Recommendations

Retention of current legislation regarding sardine fishing seasons, requiring either the repeal or renewal of Section 8152 of the Fish and Game Code.

NOTE: Proposed legislation implementing this recommendation appears as Appendix C and was introduced January 7, 1959, as Assembly Bill No. 71 by Mr. Thomas by request of this committee.

SPINY LOBSTER

The southern California fishery for the spiny lobster is in a fringe area stocked from the south, and although the fishery is relatively stable, there are indications from previous research that it is not being exploited to its maximum long-range potential. Research conducted in 1955 carried the implication that a closed season and size limit for spiny lobster are of negligible value, but the study recommended that more research be applied in these areas. The current season extends from October 1st through March 15th and a 3¼-inch minimum size limit exists.

Testimony received by the committee during the interim period indicated that there was concern in some quarters that lost traps, or those that break away from fishermen's lines, account for a considerable loss of lobsters caught inside such traps when they settle to the ocean floor. Personnel from Scripps Institute recommended a redesigned lobster trap including replaceable corrosive metal wires that eventually would disintegrate, allowing escapement of the trapped lobsters.

Several lobster fishermen were contacted and almost all were of the same opinion. They felt that lobsters are capable of leaving traps as easily as they enter and that once the bait is gone, the trap will no longer attract lobsters and those already in the trap will leave. Two suggestions were made by some lobster fishermen and by marine wardens. One was to use a zinc wire that would corrode rapidly in salt water to fasten the trap doors. The other suggestion was to put a piece of cotton webbing somewhere in the wall of the trap. Although the cotton would then rot in a relatively short time, this method of providing escapement would require considerable maintenance.

Findings

It would seem appropriate that before any recommendations can be made, some field tests incorporating the above suggestions should be conducted to test escapement of lobsters from traps.

TUNA

During the interim period, the dire situation in the California tuna industry was brought to the attention of the committee. In 1951, there were approximately 3,000 boats being operated in California waters by the California fleet; in 1957, there were 889; of the 235 clippers operating in 1951, only 152 were fishing in 1957; and the seiners had decreased in numbers to an all-time low of 53 boats. Testimony indicates that this condition has been the direct result of tuna importations from Japan.

Japan has increased its fleet tremendously in recent years and the large amount of import increases has had an adverse effect on the price canners will pay for California tuna. Fishing by the California fleet is good, but the price is low. Testimony revealed further that if the price of tuna were $300 a ton, the California tuna industry could support between 225 and 250 vessels that would be able to land approximately 45 million dollars worth of fish yearly. Currently, however, the price is $250 a ton and the industry is able to support only about 75 boats that will land approximately 12½ million dollars worth of fish yearly.

It was pointed out that in 1951 the sale of canned tuna in America was approximately 10 million cases. In 1957 this figure approached 17 million, the increase having been absorbed by the Japanese fishery and not the California fleet. Japanese tuna imports arrive in this country in bulk and raw state, being processed and canned upon arrival. Some of the imports currently arrive at American canners in the disc and loin state and all that is necessary for processing is application of the can lid. It is felt that this situation, plus comparatively lower Japanese wages, has unleashed an unfair competition upon the California tuna fleet and has adversely affected the industry.

Findings

This committee, in deepest sympathy with the interests of the California tuna fleet and industry, is desirous of obtaining some relief from the increased flow of imports. The committee feels, however, that it is powerless to act definitively in this sphere of international relations.

Recommendations

Adoption of a resolution urging that the appropriate Congressional committee hold a hearing in the San Diego area specifically on this situation. The Assembly committee would expect to be present at any such hearing.

NOTE: A proposed resolution implementing this recommendation appears as Appendix D and was introduced January 13, 1959, as Assembly Joint Resolution No. 3 by Mr. Cusanovich at the request of this committee.

WHITE SEA BASS

Statistics attest to the fact that the white sea bass catch has declined in recent years, but it should be pointed out that the nature of the commercial and sport fishery for this specie does not accurately reflect the abundance of the fish. For example, the commercial fishery is strictly for the fresh fish market and, when the market becomes glutted, the price goes down. Fishermen then do not consider it worthwhile to fish the specie and the catch statistics decline correspondingly.

In addition, the erratic nature of the white sea bass sport fishery affects the total yearly poundage landed. With regard to party boat activities, this fish is not specifically sought but is caught only incidentally when found.

Testimony presented by fishermen and substantiated by fishery biologists indicates that considerable damage to fish on lines and in nets is caused by sea lions. It was pointed out that if this predation could be curtailed, the fishery would improve to some degree.

Findings

(1) Economics is the controlling factor in this fishery, precluding any legislative recommendations by the committee;

(2) Predation by sea lions accounts for sizable losses of white sea bass caught by fishermen.

NOTE: Further discussion of sea lion predation and its possible control is contained in the predator section, p. 46.

YELLOWTAIL

During the 1957 season, the total catch of yellowtail amounted to four times the numbers landed in the previous 10 years combined, and the 1957-1958 fishery has been the best that has occurred in 25 years. Among reasons advanced for the tremendous increase in landings has been the assumption that 10-12 degree warmer water currents have attracted the yellowtail farther north and that the minimum size limit has allowed an increased reproduction.

Although this is not a desirable cannery fish, there is an extensive sport fishery for it. As a matter of fact, the Ocean Fish Protective Association has recommended that yellowtail be set aside specifically as a game fish. The majority of the population is in Mexican waters and the California fishery is on the fringe of the range, dependent upon oceanographic conditions and the whims of the fish. In California, there currently is a May 1st to August 31st limit of 500 pounds per person or 2500 pounds per vessel at any one time, and during 1955 and 1956 there existed a 3,000-ton limit on the commercial catch. In addition to the bag limit regulations, there is a 28-inch minimum size limit that seems to be accepted by the majority of interested persons as adequate.

Findings

Inasmuch as there is no real demand for yellowtail as a commercial species, but there is a small amount of commercial activity, it would seem that no great degree of competition between sport and commercial fishermen would exist on yellowtail, and further that the OFPA recommendation is not critically needed for conservation purposes. Again, in light of the minor commercial fishery, it would seem that a limitation of the commercial catch is not too effective since economics is the controlling factor.

Recommendations

(1) Retention of the 28-inch minimum size limit to protect and preserve the yellowtail spawning stock;

(2) Retention of the yellowtail as a game and commercial specie.

NOTE: These recommendations require no additional legislation.

SALMON

During the 1957-59 interim period, the committee devoted two full hearings to the critical California salmon situation. In Arcata on January 27, 1958, the Department of Fish and Game presented an informative and comprehensive report detailing all aspects of the salmon resource, including its history, causes of the current situation and expectations for the future. In Fort Bragg on November 13, 1958, the Salmon Unlimited organization presented its legislative proposals to save the depleted resource in California waters.

The Salmon Story—1958

At Arcata, testimony revealed that when the white man first came to California, there were 6,000 miles of spawning area in central valley streams and that by 1928 this number had decreased to 528 miles. Currently, there are about 300 miles available for salmon spawning.

Some of the important factors contributing to this decrease have been the following:

(1) Pollution that destroys food upon which salmon depend, actually suffocates fish and presents solid blocks to migration;
(2) Increased predation and increased fishing pressure off the Oregon and Washington coasts;
(3) Damage to watersheds by over-grazing, careless logging practices, agriculture, forest fires and mining activities;
(4) Flood control projects causing a change in downstream water flows and high dam construction preventing the operation of fish ladders and flooding of spawning riffles; and
(5) Gravel extraction from stream beds.

It was emphasized that no single corrective action could bring back the fishery to its former levels. For example, elimination of pollution alone will not increase salmon production and survival if adult fish are blocked from their spawning areas.

With regard to partial corrective action, the department feels that it should be allowed to determine flow requirements on every proposed development project in order to insure an adequate water flow and temperature. In addition, the department plans to construct artificial channels for natural propagation rather than constructing more hatcheries, based on the fact that production on natural spawning beds is so much greater than in a hatchery. The department is also of the opinion that some method needs to be developed to identify ocean fish as to their stream of origin in order that each river system and each tributary's contribution to the total population could be determined.

The department's report noted that 1919, 1946 and 1955 were peak years of comparative abundance. Research has developed the theory that only one salmon out of 2,000 eggs deposited need survive to spawn in order to maintain a stable population. Of the other 1,999 potential spawners, three are taken in the fishery and the rest succumb to disease, parasites and predators long before they reach catchable size.

Regarding fishing pressure, California commercial fishermen have landed an average 200,000 fish annually for the last 10 years, an increase of 160,000 fish annually over the last 41-year average. The trolling fleet increased from 570 boats in 1935 to 1,648 boats in 1956 and the

sports catch increased from almost nothing in 1946 to 118,000 fish in 1956. Spawning stocks decreased alarmingly in 1957-58 to less than 200,000, whereas the department estimates that at least 500,000 are necessary to maintain the run.

Attempts to cope with this alarming and grave situation include curtailment by the California Legislature of the commercial net fishing in the Sacramento River, shortening of the ocean commercial season by Washington, Oregon, Canada and Alaska in order that the entire Pacific Coast season opened simultaneously and banning high sea netting off the entire coast. Coleman and Nimbus hatcheries have been constructed and Lewiston is under construction to help maintain the salmon runs. In addition to hatchery production, about 1,500,000 salmon are planted in the Klamath River every year and successful experimental plantings have been made in Mill Creek and the San Lorenzo River. A large number of eggs is taken at Pudding Creek Station, operated by Mendocino County sports and commercial fishermen. Fish from these eggs are replaced in Pudding Creek, but plantings in other streams are expected in the near future. On a co-operative basis, California obtains over 500,000 silver salmon eggs yearly from Oregon and Washington.

Another important aspect of the salmon resource is the fact that a large proportion of spawning riffles is on private property or property that cannot be publicly controlled. Where this situation exists, water flows can be altered, gravel can be removed, temporary carriers can be erected and water can be diverted. For example, gravel companies removed a mile and a half of the best riffles in the Stanislaus River.

Salmon Unlimited's Proposals

The legislative program presented by Salmon Unlimited contained the following important steps necessary to bring the salmon resource back to its former productivity:

(1) Initiation of a three-year marking and releasing program in the Sacramento River to trace the salmon runs and returns and to determine the effect of predation, diversions and water conditions in the downstream migration;
(2) Enactment of legislation to secure adequate flow and water in streams having anadromous fishes;
(3) Initiation of predator control programs on sea lions, grebes and mergansers;
(4) Prohibition of gravel removal from spawning beds; and
(5) Initiation of adequate stream clearance projects and better logging practices.

Hatchery Operations

During the 1957-59 interim, the committee received testimony and reports regarding the operation, production and cost of state and federal salmon hatcheries throughout California. The committee also received in early January, 1959, a report from the Department of Fish and Game covering salmon output through December 31, 1958. Indications from these sources are that king salmon egg production has spiraled at the two salmon hatcheries in California, Nimbus on the American River near Folsom and Coleman on Battle Creek near Redding.

As of December 31, 1958, the take at Nimbus was 13,402,000 eggs, roughly 16 times greater than the previous season's production. The total egg output at Nimbus for previous seasons was 847,000 for 1957-58, 2,500,000 for 1956-57 and 10,634,530 for 1955-56. The department, operating this hatchery with support of Federal Bureau of Reclamation funds, stated that production would have been higher through 1958 if unseasonal warm water had not occurred. But, despite warm water flows and the necessity of trucking adult salmon to higher, cooler Sierra streams, egg survival amounted to 70 precent. Of the 14,856 king salmon that arrived at the hatchery, 4,707 fish got through the racks and spawned in the area between the racks and the dam.

A report by the department's inland fisheries branch discloses that for the 1957-58 Fiscal Year, the State raised 2,030,966 pounds of salmon at a cost of $0.77 per pound. This represents a decrease of eight cents a pound from the previous year cost estimate, but the report contained a warning that future production cost reduction could not be expected in the face of ever-rising operating expenses.

At Coleman Hatchery, the United States Fish and Wildlife Service reported a total egg output of 28,037,000 as of January 5, 1959, compared to an annual average of 26,000,000 during the last seven years. The federal agency expects the total spawning run output at Coleman to be between 32,000,000 and 35,000,000 eggs.

Findings

If California's salmon resource is to be brought back to its former abundance, immediate action is necessary somewhat along the lines of the program outlined by Salmon Unlimited. And, while this committee has not had sufficient time to study these proposals, the marking and releasing program, the gravel removal prohibition, stream clearance projects and improved logging practices all seem worthy of serious consideration by the Legislature.

UPLAND AND BIG GAME

DEER

The first two 1957 meetings of the interim committee were held at Redding and Susanville on August 12th and 13th.

Although the subjects scheduled for discussion at these meetings included the Kamloop project in Shasta Lake, salmon marking, the hatchery expansion program, wildlife habitat improvement, big game management and stream pollution, the latter two items consumed almost the full time allotted for discussion by the committee.

With regard to big game management, it was hoped that the discussion would be primarily concerned with migratory deer herds; however, oral testimony dealt considerably with the relative merits of the special either-sex and antlerless hunts having a direct bearing on the management of not only the migratory but also the resident herds.

Following, then, is a resumé of the migratory herds ranging for part of the year in sections of California, together with summary reports of the activities of the various co-operating committees assigned the responsibility of making field investigations and recommendng management of those herds. Following this is a section devoted to special antlerless hunts.

Migratory Deer Herds

There are 12 distinct migrating herds included in what are termed "six working units" by the Department of Fish and Game. Included in the Yreka working unit are the Hamburg and Copco Herds; in the Devil's Garden working unit are the Interstate, Brant Mountain and East Warner Herds; the Doyle working unit includes the Eagle Lake and the Lassen-Washoe Herds; the Truckee-Carson working unit is composed of the Verdi and the Carson River Herds; the Mono working unit includes the Walker River and Mono Lake Herd; and Inyo working unit contains the White Mountain Herd. Most of these herds have limited migration between states. However, three interstate deer herd committees have been formed to deal with the management problems revolving around the most important of the migratory deer herds.

These three committees are the Devil's Garden Interstate Deer Herd Committee, the Carson-Walker Interstate Deer Herd Committee and the Lassen-Washoe Interstate Deer Herd Committee. The activities of these three committees are discussed below as indicative of the type of work and co-operation being engaged in by the states and public service units involved.

Devil's Garden Interstate Deer Herd Committee

This committee conducts studies of the deer herd composed of Rocky Mountain mule deer summering principally on the Fremont National Forest in Oregon and wintering on the Devil's Garden area in the Modoc National Forest in California. The Oregon summer range covers approximately 400,000 acres and the California winter range 335,000 acres. The acreage on which the deer spend the greater part of the winter covers approximately 100,000 acres, the remainder of the winter range being the area through which the deer pass on their migration routes. Also wintering in the Devil's Garden area are considerable numbers of deer from summer ranges in California.

Because of the fact that since the turn of the century this area has been heavily used by both livestock and wildlife, it has become overbrowsed. However, since the Modoc area became a national forest, United States Forest Service officials have limited the amount of livestock using the range and, before the Interstate Committee was formed, made recommendations for the management of the deer to maintain a balance with the range. Recognizing the joint responsibility for the management of these deer, the Interstate Committee was organized in 1945 to study the deer-livestock problem of this particular winter range. This committee is composed of members of the Oregon Game Commission, the United States Forest Service and the California Department of Fish and Game as well as representatives of organized sportsmen and livestock associations.

Studies represented in the committee's annual reports have resulted in the adoption of a plan for management of the Devil's Garden winter range. This plan sets up guides for regulation of both deer and livestock numbers, and as a result the United States Forest Service has reduced the number of livestock permits in this area, and the Interstate Committee has made recommendations for special hunts to reduce the size of the herd by the taking of antlerless deer.

Over the years the committee has fostered the following investigations: deer herd collections to determine general condition, disease, parasites, productivity and food habits; road kill for the same purpose; trapping and marking; predator control; wild horse removal; livestock use reduction; antlerless deer removals; salting experiments; deer herd composition counts; census method trials; carcass counts; annual forage utilization checks; range trend inventories; range reseeding; habitat improvement work and range revegetation studies. As might be expected, the committee has made several refinements in carrying on its investigations. For example, the program of establishing forage plots to show range use was reduced to a representative heavy-use area. Based upon its investigation, the committee has generally decided that proper harvest quotas are the key factors in deer management.

Contributing to the reduction of the range capacity to provide for a larger herd have been livestock and deer overbrowsing and fire, insect and rodent damages. Overbrowsing of the existing forage quite often has resulted in the dying of plants. Through 1951 approximately 225,000 acres in the winter range had burned, including several areas which burned more than once. For the most part, a sub specie and one of very little nutrition called "cheat grass" replaced the original nutritious forage that had burned. This type of cover also increased the fire hazard considerably.

A forest utilization check is made each spring by counting groups of deer droppings on 10-acre strips which are 11 chains long and six feet wide. The pellet group count is converted into deer days by use of a conversion factor of 12.7 groups per deer day, a factor established in a previous study. The pellet group counts are not used to determine deer population, but rather as an indicator of the trend in deer use in an area.

The deer in this herd are under constant surveillance during the wintertime in California and careful records are kept of the following: buck-doe-fawn percentage in the herd; buck-doe and fawn-doe ratios;

antler point classes by percentage of the bucks; browse consumed by percentage taken in sampling; and determination of the causes of deaths of deer not shot during the hunting season. During the season 1951-52, the adverse winter conditions and the lack of sufficient forage on the range contributed to a calculated loss to the herd of approximately 32 percent. In the key management area where the greatest concentration of deer occurs during the wintertime, it is interesting to note that of the 1,000 acres in that area, 680 are totally non-productive, 79 acres produce annuals, 108 acres produce perennial herbs and 133 acres represent the total amount of browse growth.

Since browse is the major item in the diet of deer and is especially important on snow-covered mountain ranges, and because desirable browse has been greatly reduced by heavy grazing, fire, insect depredation and other factors, the California Department of Fish and Game, using Pittman-Robertson funds, has contracted with the California Forest and Range Experiment Station to undertake a statewide browse research project with the goal of developing practical methods of artificial reseeding and other cultural methods of restoring browse on depleted winter deer ranges.

The records of the Devil's Garden Committee have been in existence for a sufficient period of time so that, in using the same type of methods from year to year, definite trends can be established and recommendations for deer herd harvest and domestic stock grazing quotas can be made annually to maintain a favorable deer-livestock balance with the range. To increase the use potential for both wild and domestic animals, all known methods of regeneration of the range must be employed. Several thousand acres have been revegetated and reseeded by various methods meeting with some degree of success, although much can yet be accomplished.

Lassen-Washoe Interstate Deer Herd Management Committee

This committee was organized in 1949 and is composed of representatives of the Nevada Fish and Game Commission, the United States Forest Service, the Bureau of Land Management and the California Department of Fish and Game, with representatives of the sportsmen, stockmen and landowners participating in an advisory capacity. This herd's winter range is located principally along each side of the boundary between Lassen County, California, and Washoe County, Nevada, and in the vicinity of the town of Doyle. It embraces a study area of 228,400 acres of public and private lands. The combined summer and winter ranges of this herd of Rocky Mountain mule deer comprise about 753,000 acres. The same problems exist with this herd as those pointed out with regard to the Devil's Garden Herd, primarily centering around fire, insects, and over-browsing by deer and domestic livestock.

The committee has determined that it is desirable to maintain the herd at a level found on the range during the winter of 1952-53—approximately 12,000 deer—so that an approximate 50-50 division of the bitter brush forage crop between livestock and deer would result. Since private landowners have indicated that they would tolerate a population of deer similar to that on the range during the winter of

1952-53, and since sportsmen would benefit from a higher production of deer for harvest each year on a sustained yield basis, the California and Nevada State Game Departments agreed to attempt to maintain and improve range conditions within their respective areas of responsibility and to recommend the number of deer which should be taken from the herd. The United States Forest Service subsequently agreed to maintain the permitted livestock numbers in the winter range areas on lands within its jurisdiction at or below the 1952-53 obligation. The United States Bureau of Land Management also agreed to maintain the permitted livestock numbers on public domain land in the winter range area at or below the 1952-53 grazing level. The Interstate Committee determined that the level of stocking recommended in this plan was too high to permit a rapid recovery of the depleted bitter brush stand on the Lassen-Washoe winter range but that the level should bring about a gradual improvement of the range and was a step toward the conservation of this valuable forage resource. This herd also experienced a great mortality during the heavy winter of 1951-52, the computations indicating that of the 35 percent mortality, 19 percent were adults, 63 percent were fawns and the rest yearlings.

The Interstate Committee has repeatedly referred to the fact that the condition of the range is the most important factor in the management of the deer herd; that is to say, the controlling of deer and livestock at a level at which over-browsing and over-grazing is minimized to insure a healthy range. The committee has pointed out that once a range is depleted, forage recovery requires a long period of time, whereas the deer herd itself is a rapidly renewable resource. Although the Interstate Committee has repeatedly made recommendations for harvesting an over-population of deer in the herd to bring it in balance with the range, such recommendations have not always been acted upon by California agencies, resulting in a considerable fluctuation of deer harvested from this herd in the last few years. This has produced an imbalance since Nevada has generally complied with the committee recommendations.

A considerable amount of reseeding of burned-over areas and experimental revegetation has been performed on this range by various state, federal and private agencies, with varying degrees of success. It was found, for example, that the greatest success in the area east of the Sierras came from drilling and planting at a depth of slightly more than two inches.

As stated by the committee, its primary objectives are to prevent the wastage of deer that now occurs as a result of periodic die-offs from lack of forage and to halt depleting forage stands on the winter range by calling for adjustments in stocking in order to approximate a balance between forage utilization by deer and by livestock. Other objectives are to improve forage conditions through the maintenance of proper stocking, the planting of forage species on suitable sites, other range improvement measures to improve techniques for management of this important interstate deer herd in order to increase production and survival, and to allow the harvest of annual increases rather than leave the deer to damage the range and die from natural causes.

Carson-Walker Interstate Deer Herd Committee

This committee was initially formed in the summer of 1952 for the purpose of studying interstate deer herds in the Carson and Walker River areas and to make recommendations for their management. The committee is composed of representatives of the Northern Mono Conservation Club, Alpine Sportsmen's Club, the Nevada Federated Sportsmen, livestock interests, High Sierra Packers Association, Farm Bureau, United States Forest Service, United States Bureau of Land Management, United States Fish and Wildlife Service, United States Bureau of Indian Affairs, and the Nevada and California Fish and Game Departments. This committee functions through various subcommittees which have been designated as Fire and Livestock Use History, Range Studies, Winter Deer Countings, Soil Conditions, General Land Use, and Arrangement Committees.

As in the studies of the two previously mentioned committees, it was generally found that the herd condition was directly proportionate to the condition of the range. This committee conducts extensive and intensive studies of various sections of the range to insure an overall coverage and makes recommendations for control of deer upon those ranges. Much of the data of the discussions on the two previous herds is applicable to the Carson-Walker interstate deer herd. The range use is consistently determined by pellet group counts and correlated with the condition of the forage; and while these factors form the basis of recommendations made to the California and Nevada departments, this interstate committee also emphasizes that the most valuable deer management tool is proper harvest quotas.

MANAGEMENT PRACTICES

At the Redding and Susanville hearings, representatives of Oregon and Nevada game management agencies explained their practices with regard to migratory deer herds. Their testimony supported California's attempts to keep the migratory herds in balance with the poorest range the deer must use during the year. They also admitted that such a policy was not agreed to by all individuals in their states, but that independent investigations by other states had resulted in similar conclusions for management of the deer resource.

It was also pointed out that many sportsmen's organizations and interested unattached sportsmen in other states recognize the practicability of California's deer management methods. Their recognition has been based upon documentation by several scientific reports published by agencies other than the California Department of Fish and Game.

Testimony further indicated that more intensive management of particular areas in the State might result in a change in the existing local procedures to a small extent because of the mobile changes in deer herd conditions. Biologists have stated, however, that it is neither economically feasible nor absolutely necessary to provide intensive management on various small groups of deer when the majority are under intensive management on a cumulative herd basis.

If California's present methods of deer management seem to be the most practical and if those methods are generally supported by other states, then it would seem reasonable to assume that the majority of the people interested in deer management problems in California should

be willing to accept these practices. It was readily apparent at the Redding and Susanville hearings that such is not the case.

The Department of Fish and Game insisted that the deer herds are being held at a fairly static level, fluctuating only when range conditions permit. The sportsmen, however, insisted that some deer herds are almost completely depleted. Adding to the confusion were complaints of the ranchers that depredation problems are on the increase rather than on the decrease. There was a considerable disagreement by those testifying as to the percentage of people who did not agree with California's northern county game management program. It appeared that the majority of ranchers, federal men engaged in manging the federal resources, and technical representatives of the various states attending the meeting agreed that the existing management practices were the most valid. The majority of the sportsmen present were violently opposed to these programs and placed considerable emphasis on the fact that more effort should be made to increase the carrying capacity of the ranges.

It should be recognized that any deer management program is dependent upon many factors, including weather, hunter pressure, brush manipulation, vegetation, insect and predator control, domestic livestock competition and fire. In addition, the basic soil and forage resources must be maintained in healthy condition or future deer production will suffer. To protect these resources, a balance must be maintained between deer numbers and food supply. It is historical fact that when shrubs are gone deer die, with fawns usually the first to go.

With regard to artificial feeding, these factors were pointed out by game biologists: (1) the program is costly and reaches only a small portion of distressed deer; (2) concentrations around feed grounds tend to encourage the spread of disease and parasites; (3) digestive adjustments in deer take time and any sudden dietary changes could be fatal to weakened animals, as has been the case in many instances of dead deer being found with stomachs full of hay; (4) weather emergencies cannot be predicted and therefore prior feeding is impractical; and (5) losses have been relatively higher in areas where artificial feeding has been supplied.

Either-Sex or Antlerless Hunts

The subject of either-sex or antlerless deer hunts has recieved considerable airing by the Senate and Assembly Interim Committees since the unfortunate experience of such a hunt in the latter part of 1956. However, it seemed that the great majority of those testifying at the Assembly 1957 hearings in Redding and Susanville generally agreed that the taking of antlerless or either-sex deer is desirable in order to maintain a proper herd-range balance. The real criticism of these hunts was directed towards the method used in the fall of 1956 hunt. It appeared that all persons testifying realized that the Department of Fish and Game recognized its own mistake in scheduling a special hunt at the end of the regular season resulting in a concentration of hunters in a particular area at one time, especially in the northeast counties. The end result of these unfortunate circumstances is that subsequent either-sex and antlerless hunts will be conducted during

the regular hunting season in order to eliminate the reoccurrence of the 1956 special hunt fiascos.

Conflicting testimony was given during the hearing as to the size and condition of the interstate deer herds, but no subtsantiating evidence was offered which would verify the fact that the deer herds were close to extinction. However, considerable evidence was presented to substantiate the fact that the deer herds were being maintained at generally the same level. The one point upon which all seemed agreed was that there should be continuous and accelerated co-operation between the various states involved in the management of these interstate deer hunts so that the desired end result could be achieved. It was pointed out that Oregon and Nevada concur for the most part in the recommendations and carry on their hunts accordingly, but that quite often California does not. For that reason, it seems that a large enough percentage of antlerless deer is sometimes not harvested to maintain the desired balance with the range.

In consideration of the Devil's Garden Herd, for example, management is keyed to the California winter range because it has less carrying capacity than Oregon's summer range. Using a hypothetical case for illustration, we may assume that the Interstate Committee has determined that 8,000 antlerless deer should be taken from the herd. A 50-50 allotment is generally made between states. If 4,000 antlerless deer were then harvested in Oregon and none in California, the range balance problem would not be solved because theoretically there would be 4,000 too many deer on California's range with a resultant overforaging. It is conceivable that the Interstate Committee, in order to insure a healthy herd in balance with California's winter range, might then determine that Oregon hunters should be allowed to take California's share in the event that no such hunt were allowed in California. The same premise would hold true for all the interstate herds. This would seem to amplify the importance of California's maintaining close co-operation with the other states involved in order to insure adequate and substantial information for all boards and agencies concerned with the controlling of the deer herds. In this way, wise game management could be effected, and hunters in all states involved would receive equitable consideration.

Findings

(1) The interstate migratory deer herds are the product and joint responsibility of the states involved and interstate committees concerned with specific herds maintain the only known records on those herds.

(2) Although there is some disagreement between individuals and the committees relative to the management of these herds, no substantiating evidence was submitted which would indicate the present management procedures are not the best.

(3) Deer management throughout the states adheres to one concept: Maintaining the herd population in balance with the range and attempting, where economically feasible, to increase the carrying capacity of the range.

(4) The various responsible agencies have not devised an infallible method for determining an accurate census of the deer herds. However,

game management units have established that it is unnecessary to know the exact numbers of deer in order to make specific deer harvest recommendations inasmuch as it is fairly simple for trained observers to determine the trends of the herds from careful analysis of the condition.

(5) Of the factors affecting the size of a herd, such as weather, range conditions, hunting and predation, the latter two are the most economically controllable.

To control the range completely, 100 percent fire protection, insect control and revegetation must be provided. The range can be improved to the extent which is economically feasible in considering the benefits of the resource involved.

Inasmuch as the known ranges are generally overbrowsed, it should be unnecessary to maintain a predator control program. Predation is one natural method of helping to maintain Nature's balance. Game management organizations concerned with the interstate herds maintain that the annual crop of deer which should be harvested is being relatively unachieved by hunters and until the hunters can take the desirable quota from the herds, maintaining effective predator control merely compounds the problem of overpopulation.

Hunter-take, then, is a very valuable controllable tool in game management. In many areas of the State, deer fatality attributable to hunting approaches only 5 to 7 percent, the rest being taken by such factors as weather conditions, malnutrition, disease, predation and highway kills. In areas where either-sex and antlerless hunts are held, hunter-take of the total deer kill runs considerably higher.

Because of the fact that historically a certain percentage of deer will die in a given herd, depending upon the range condition, it appears only logical that hunters be afforded the opportunity of increasing their annual take by whatever method is felt necessary to reduce the waste of deer occurring at present in California.

(6) It is imperative that continued and increased co-operation be carried on with neighboring states to insure healthier animals, better range conditions and fair and equitable annual deer harvesting of surplus deer in those states involved with California in the management of the interstate deer herds.

(7) It would seem that unless any individual or organization is able to come forward with a plan backed by sufficient data justifying a change, existing deer management practices in California should be continued.

Recommendation

Renewal of the so-called "Busch Bill" for a two-year period.

NOTE: Proposed legislation implementing recommendation (7) appears as Appendix E and was introduced January 13, 1959, as Assembly Bill No. 187 by Mrs. Davis by request of this committee.

DOVES

During the 1957-59 interim period, a prolonged and heated controversy was generated by the introduction and referral to committee of Assembly Bill No. 2307. This measure had as its purpose placing doves on the protected list of nongame birds, thereby outlawing dove hunting.

Subsequent to two committee hearings where the proponents and opponents of this bill presented their views, a letter-writing campaign of gigantic proportion was initiated by the Southern Council of Conservation Clubs and by the Committee for Dove Protection. At this writing, the Assembly interim committee office had received 21,078 letters on this subject, and various Southern California legislators had received approximately 8,000 letters and post cards.

While the great majority of this correspondence was in the nature of form letters to which the sender merely signed his name, there were many letters of an individual nature. The mail pressure was so great at one point during the fall of 1958 that the committee issued a press release announcing that all letters were appreciated and would be given due consideration, but that each letter would no longer receive an answer.

The dove most hunted in California is the mourning dove (*Zenaidura macroura*) and in the last 10 years approximately 2½ million birds a year have been harvested. Inasmuch as the dove is a migratory species, the United States Fish and Wildlife Service has the responsibility of setting the maximum hunting season and the states may set their own seasons within these maximum limits. In 1958, for example, the federal agency permitted a 45-day season and the California Fish and Game Commission allowed a 30-day hunt.

Testimony presented at the committee hearings and by letter indicates that the proponents of Assembly Bill No. 2307, the Committee for Dove Protection, base their arguments on the following:

(1) Opening the season on September 1st is a fallacy because 10.8 percent of the young are still in the nest and both parents must attend their young; the young are doomed to death by starvation or thirst if one parent dies;

(2) Dove hunters are generally the most destructive and most irresponsible segment of the hunting population; they do not confine their shooting to doves, but hunt quail out of season, meadowlarks, robins and other song birds; if their actions persist, farmers conceivably could close their lands to all hunters;

(3) Trespass laws are not stringent enough and are broken most often during dove season when more depredation and vandalism occurs than other times; this also has caused ill will between hunter and farmer;

(4) Doves are weed-seed eaters and help the farmers' cover crops in this way;

(5) California's dove population is on the decrease, due to the increase in the number of hunters and development of better weapons;

(6) Doves are not game birds; they are too easy a mark;

(7) Thirty-three percent of those shot are unretrieved, lost or maimed.

The Southern Council of Conservation Clubs and hunters in general base their opposition to Assembly Bill No. 2307 on the following:

(1) Almost anyone is able to shoot doves; they are close at hand and it is not necessary to belong to a club or to purchase costly equipment;

(2) California's dove population is increasing even with the increasing number of hunters;

(3) Hunter pressure is not a controlling factor in dove survival; availability of food and nesting sites are;

(4) Dove hunting provides beneficial training for youths; more youths are exposed to dove hunting because of its availability; they must have a hunter's safety certificate prior to obtaining a hunter license; this insures good training in firearm safety;

(5) If doves are protected in California, this will provide more birds for Mexico or wherever else they might migrate;

(6) Their habitat is the most widely distributed of any game in California;

(7) There is still about one-half of California that is not open to hunting, such as city, state and national parks.

With regard to the status of the dove population in California, the Department of Fish and Game has testified that the resource is not in danger of depletion and is, in fact, on the increase. The department feels that the consistently high annual take is partial proof of this; in addition, the biologists point to the band return rate of about 3.5 percent in doves. Compared to the 18 percent return rate for banded waterfowl, the department feels this is a low figure and indicates that doves are not being overharvested.

With regard to the nesting habits of the doves in California, the department agrees that when hunting season opens on September 1st, 10.8 percent of all broods are still in the nests, but cites an accepted wildlife management premise that a hunting season should come as close as possible to the time the game population is at its natural peak. The department's research has indicated that doves lay only two eggs per nesting, but nest as many as six times a season with a nesting success of 65 percent. In addition, the biologists declare that doves have a longer average life span than quail and other game birds, thus compensating for the lower egg production per nesting.

With regard to the dove as a weed-seed eater, department field men studied 102 dove crops obtained from five areas throughout the State and found that only four of the 693 recognized California weeds were important dietary factors, and that none of the four was classified as a primary or secondary noxious weed under the California Seed Law.

With regard to the merits of outlawing dove hunting, the department cites another generally accepted wildlife management theory that when a wild population is allowed to increase in members, it becomes more susceptible to affliction and disease. This condition leads to an increased natural die-off.

In controversial matters such as these when conflicting testimony is gathered, it is difficult indeed for a legislative committee to come to an equitable solution that will permit the wisest management of a natural resource.

Findings

(1) The dove in its present classification with other California game birds provides the hunting population with a valuable and vital recreation;

(2) There is no scientific proof of the dove population's decrease in California; in fact, the consistently high yield over a period of the last

10 years indicates that the population is holding its own or is on the increase;

(3) This committee expresses sympathy with the dedication and sincerity of those opposed to dove hunting, but unless the dove were in danger of extinction, this committee could not conscientiously recommend its exclusion from the game bird list;

(4) Opposition to dove hunting seems to be directed to a great extent to some dove hunters and their conduct in the field. Ample testimony was presented to the effect that hunters in some areas seem to have little regard for farmers' and landowners' property by breaking down fences and that they shoot protected birds and other game birds out of season. This reprehensible unsportsmenlike conduct certainly is not to be condoned; neither does it seem to be sufficient reason for outlawing dove hunting especially when, on a statewide basis, dove hunting provides recreation for a great number of people. Rather, it seems to be a matter of hunter education and legal enforcement.

Recommendation

Retention of the mourning dove as a game bird in California.

NOTE: This recommendation requires no additional legislation.

PHEASANTS

Once again, the Fish and Game Department's policy of raising and planting the Chinese ringnecked pheasant "for the gun" was given considerable deliberation during the interim and at committee hearings.

It will be remembered that the committee's 1957 report resolved that: (1) the department re-evaluate the raising and planting program with the idea of gradual elimination in areas providing natural conditions adequate for natural propagation; (2) planting be continued in areas where natural habitat and environmental conditions are not conducive to natural propagation; and (3) consideration be given to the possibility of supplanting department-raised birds with commercially raised ones. Conclusions reached in that report were to the effect that the game farm program contributed little to the statewide natural pheasant population, that the program was very uneconomical and that it was impractical to continue stocking for the gun.

These conclusions were reached in view of the department's figures that less than 2 percent of the planted birds survive the winter because most of them are taken by predators, weather or their inability to forage for themselves.

During the 1957-1959 interim period, the committee received testimony similar to that just cited. At the hearing in Visalia, for example, pheasant production efforts by the State and by sportsmen's groups were reviewed. Raising pens formerly operated at the Porterville and Bakersfield Game Farms were dismantled, turned over to sportsmen's groups and reassembled at Tulare County Prison Farm and the youth camp near Kernville. After the sportsmen took over the operation with free prison labor, the cost of raising the pheasants from four weeks of age to maturity was reduced to approximately $0.66 per bird, supported by county fine money. The chicks were supplied by the State

Game Farm at Fresno and the cost figure does not include releasing operations.

It was further indicated that even with this seemingly low figure, the entire raising and releasing program is uneconomical since approximately only 10 percent of the pen-raised birds are bagged by hunters. The department has concluded that in order to get a reasonable take by hunters, releasing of the pheasants must occur immediately preceding the opening of the season and on public shooting areas. During 1957, approximately 50,000 birds were released under this program, of which approximately 10,000 were eventually bagged.

Recommendations

(1) This committee again urges that serious consideration be given to the termination of the "put-and-take" pheasant management program on the basis that it is uneconomical and unscientific;

(2) If the "put-and-take" policy is abandoned, the current pheasant tag fee should be continued inasmuch as that fee originally was intended to defray the cost of co-operative hunting area programs.

NOTE: These recommendations require no additional legislation.

WATER POLLUTION *

INLAND WATERWAY POLLUTION

Heavy Mineral Leaching

At the committee hearings in Redding and Susanville, two primary sources of heavy mineral leaching were discussed.

The first of these concerned the Mountain Copper Company operations on Spring Creek, Shasta County. At the time of the hearings, the Philadelphia Academy of Natural Science had determined the source of the pollution and the Los Angeles consulting firm of Leeds, Hill and Jewett had made recommendations for its control.

The pollution problem in this area has developed as a result of the Central Valley Project. Before water retention structures were put upon the Sacramento River, dilution was a natural process; but with water flow controls by the Bureau of Reclamation fluctuating to a few hundred second feet, the heavy mineral concentration has taken its toll of many fish. For example, thousands of king salmon fingerlings died in 1955 when the river flow was reduced to an extremely low point and the normal flow of pollutants continued from Spring Creek. An additional kill of at least 411 salmon occurred January 9-10, 1959, as a result of inadequate dilution of these pollutants.

According to the consulting firm, the water draining out of the workings of the old mines in Iron Mountain is the primary source of the heavy metals carried in solution by Spring Creek. There are no feasible means by which water could be prevented from percolating into the old mine workings, nor would it be feasible to remove or fully prevent erosion of the tailing deposits in the watershed of Spring Creek.

Although dam construction to intercept the pollutants now carried into Keswick Reservoir and chemical treatment of the mine drainage waters would be possible, it was felt that neither of these alternatives would be economically feasible. The closure of all openings to the abandoned mines and other workings not now being operated to prevent circulation of air through these underground passages would probably reduce the concentration of dissolved solids in the drainage waters. If this "mine sealing" were effective to any substantial degree, the fish kills now believed to be caused by stream pollution in this area probably would be prevented.

The representative of the Mountain Copper Company stated that the company would cope with the problem as outlined in the consulting firm's recommended solution, the capital cost of which was estimated to be $350,000 and the operation and maintenance costs $10,000 per year. Among the recommendations were the following:

> "Sealing of all known openings to the underground workings in Iron Mountain so as to exclude air or at least to prevent circulation of air;
>
> Complete chemical analysis of the waters draining out of underground workings at No. 8 Mine Ropeway on Slickrock Creek and at Lawson Tunnel on Boulder Creek at intervals of not more than one month;

* NOTE: Pollution is also discussed in the salmon chapter, p. 20-23.

Measurements at one week intervals of the quantities of water flowing out of the underground workings; and

Construction of pipe lines and other facilities required for disposal under controlled conditions of the mine drainage waters into Sacramento River near Matheson."

The company intended constructing a modern precipitating plant and removing substantially all of the copper from the mine water, even though the consulting firm had recommended only dilution. The Department of Fish and Game has announced that it will continue to request adequate water releases from Shasta Dam in order to provide proper dilution of the normal flow of pollutants in this area.

The second source of heavy mineral leaching discussed was the abandoned Walker Mine in Plumas County where the Regional Water Pollution Control Board has followed the procedures outlined in the Dickey Act.

These procedures specify that the board must investigate any discharge resulting from existing operations and each new discharger must report to the board. The board then consults with other state agencies involved and establishes discharge requirements. After agreement by the discharger is obtained, the board issues a resolution officially establishing the requirements and makes periodic inspections. If any discrepancy is found, the matter is brought to the attention of the discharger and he is requested to correct the problem; if not, the board holds a public hearing as outlined in the Administrative Code.

Following the hearing, the board issues an order pinpointing the violation, the remedy to be effected, and the date such corrective action is to be completed. If this order is not met, the district attorney in the county concerned is informed and the situation then becomes the complete property of the court. If the district attorney does not institute proceedings within a reasonable time, the board can then request intervention by the Attorney General. Although the Dickey Act does not provide for a mandatory suspension of operations by the State, the county may secure such a suspension through a court order.

The board has established discharge requirements at the Walker Mine, but has experienced considerable difficulty in locating the owners. The problem with respect to clearing up this pollution source is one of absentee ownership and of controlling a situation not the result of current operations. The board has suggested a possible remedy whereby the waters seeping from the old mine workings could be piped into an old canal running adjacent to the mine property, with the possibility that the water would seep into the ground before reaching Grizzly Creek, which is the stream being polluted.

Logging Operations

Testimony presented at the hearings indicated that the industry is providing a self-policing on current operations, but that the real problem is the difficulty of assigning responsibility for cleaning up areas of pollution resulting from long discontinued operations. The Department of Fish and Game, some lumber companies and many sportsmen's groups have launched into an active program of cleaning up waterways where direct responsibility cannot be established.

Proposed Pulp Mill Operations

Also discussed at the hearings was the effect upon fish life of proposed pulp operations on the Sacramento River. It was indicated that the pulp industry is a desirable one because of the resulting economic benefits as well as side benefits such as the reduction of fire hazard by slash cleanups. Although treatment of waste products from the pulp mills can be expensive to the companies initially, it would seem that the desired economic and conservation results could be obtained if an effort were made by the industry and the regulatory agencies involved to reach an agreement before the operation is begun. Apparently such an approach is the practice, and all indications are that pulp mills will continue to increase in the State without detriment to the fish resource.

It was pointed out that the water pollution control boards are quite specific on discharge requirements and that they usually honor Fish and Game Department requirements, which are generally more stringent than those of the boards.

Effects of Pollution on Waterfowl

At the committee hearing in Visalia, information was offered to the effect that the Dickey Act has been extremely ineffective in the control of pollution. Examples were cited wherein pollution cases needing corrective action have been brought to the attention of the regional boards but action was not taken because of the slow processes involved in the Dickey Act. It was pointed out that the Attorney General ruling prohibits the Department of Fish and Game from doing anything directly to eliminate the untenable chronic conditions. One example was the sewage flow from the City of Los Banos discharging into a natural stream channel after passing through a small open septic tank. The sewage carried into the Los Banos waterfowl management area eventually reaches into the San Joaquin River system.

Another example was that of the Newman sewer farm where the regional water pollution board stated that the condition complies with its standards. It was pointed out that the conditions arising from this sewer farm have caused the death of many waterfowl from botulism. This would seem to indicate that the standards of the control board are not adequate where fish and game are involved. The Department of Fish and Game uses personnel to herd the waterfowl off the affected areas so that the birds will not contract botulism and spread it to other areas.

The following areas and cases were cited as needing immediate attention to clear up prevalent pollution situations: Strawberry Tungsten Mine, Granite Creek, Madera County; City of Modesto sewer farm on the Tuolumne River; Gallo Winery, Stanislaus River, Stanislaus County; City of Gustine sewer farm; Tuolumne sewage ponds; City of Turlock; Cal-Tech's Mining Company, Upper Mud Lake, Fresno County; California Hot Springs, Deer Creek, Tulare County; Standards Materials and Jamestown Sanitary District, Woods Creek, Mariposa County; city sewage treatment plant and United States Lime Products Corporation, Sonora; many oil companies in Fresno, Kern, and Kings Counties; mosquito abatement districts; sand and gravel plants on various rivers. The board executive officer mentioned that

both Stockton and Sacramento had recently made adjustments to clear up their particular pollution problems.

The executive officer stated that considerable action had been taken on almost all of the listed violators in the area. It was estimated that at least 90 percent of the threat of pollution to San Joaquin ground water would be removed in approximately one and one-half years if the discharge requirements set by the regional board were adopted and followed. It was further stated that the board had a backlog of some 3,000 discharges requiring considerable time to set requirements if necessary. Understaffing was offered as the reason for this backlog.

A representative of the Central Valley Regional Water Pollution Control Board stated that the Department of Fish and Game and the board differ in some cases but over 99 percent of the cases are agreed upon between the two agencies. The board representative stated that his agency had an understanding with the four regional fish and game managers having jurisdiction in the Central Valley areas that, in the event that some discharge action is deleterious to wildlife, the fish and game personnel can recommend or request immediate corrective action and refer the problem to the board. The board then would initiate permanent standards to be maintained.

OCEAN WATER POLLUTION

At committee hearings in San Pedro, aspects of pollution were cited in the vicinity of San Pedro and in Los Angeles and Long Beach Harbors. It was pointed out that 10 years previously the first concerted effort was made by various interested parties on the pollution problems in these areas, eventually resulting in the formation of an investigating committee having no actual legal authority. When the water pollution control boards were formed, the first concerted governmental action came into being. In 1951 the Los Angeles-Long Beach Harbor Water Pollution Control Committee was formed, publishing in 1952 a report entitled "Los Angeles-Long Beach Harbor Pollution Survey," defining the conditions current at the time of the investigation and containing detailed findings, conclusions, and certain directives as to the procedure to be used to acheive the desired conditions. Since then, the committee has published two annual progress reports and the third one is to be presented to the Water Pollution Control Board in the near future.

In January, 1954, the Los Angeles Regional Board adopted the long-range waste disposal and water quality objectives for the Los Angeles and Long Beach Harbors. Incorporated in these objectives is a state policy specifying the recognized beneficial uses of harbors and the conditions that must be maintained if those beneficial uses are to be realized. It was pointed out that although these objectives have not been fully realized, due somewhat to the changing activities of the area, exceptions to state policy have become fewer in number.

The beneficial uses enunciated in the state policy for the outer harbor are shipping, yacht anchorage, bathing, recreation, bait and small boat fishing. It was pointed out that the conditions favoring these particular beneficial uses in the outer harbor are not necessarily the most favorable for the inner harbor and in some instances are unfavorable. The inner harbor beneficial uses specifically enunciated by the board include shipping, yacht anchorage, industrial pooling, and fresh fish handling.

Most important of these beneficial uses of the inner harbor were found to be shipping and yacht anchorage for which the cities of Long Beach and Los Angeles have made a combined expenditure of more than 150 million dollars.

In the outer harbor, and in the coastal waters, it was indicated that the protection of fish life is the predominant concern. It was further indicated that, in Santa Monica Bay and extending to the coastal waters of the Palos Verdes area, a detailed monitoring program will be conducted by the committee through the co-operation of the Department of Fish and Game to determine the significance of conditions in that particular area as they relate to acquatic life. This program has as its objectives very specific goals distinct from and of a wider scope than the study which is being conducted by the Allan Hancock Foundation through the State Water Pollution Control Board.

The monitoring program off the Palos Verdes coast is particularly related to conditions affected by the Whites Point sewage outfall by the Los Angeles County sanitation districts. The board has declared that beneficial uses of the water in this area are swimming, wading, surfboarding, skin diving, water skiing, acquaplaning, paddleboarding, pleasure boating, sport fishing, picnicking, sunbathing, sea shell collection, propagation of fish and other acquatic life, commercial fishing, commercial shipping and industrial water supply. Of these beneficial uses, those considered by the board to be the major ones are commercial fishing and shipping, pleasure boating, sport fishing and the propagation of fish and other acquatic life. The board has prescribed requirements to enhance and protect these uses in waters immediately adjacent to the Whites Point outfall.

For every area of the Palos Verdes coast, the board has declared the most exacting requirement to be that "no caustic materials or substance shall be discharged to cause concentrations in the receiving waters which would be deleterious to animal, fish, plant or bird life." The mechanics of achieving these desired results are under continuous review by the board.

Testimony revealed that the Department of Fish and Game has never invoked Section 481.5 of the Fish and Game Code in the filing of formal complaints with the Water Pollution Control Board, but had often contacted the board informally to report undesirable conditions.

It was pointed out that the activities of the Water Pollution Control Board in the Los Angeles-Long Beach Harbor area involves 18 governmental agencies, each of which work without any cost to the State in conducting the majority of the work performed. The monitoring program off the Palos Verdes coast line will be done in the greatest amount by the Los Angeles County sanitation districts.

It was further pointed out that sanitation districts in the area around Palos Verdes have been doing the activities mentioned since 1937 without any regulations except those provided by the State Department of Public Health and which pertain particularly to the shore waters. It was pointed out that the flow of treated sewage from the sanitation districts at Whites Point had increased from about 20,000,000 gallons per day in 1940 to over 200,000,000 gallons per day in 1957. This increase has necessitated modifications at the outfall to insure the protection of conditions at the shore line.

The initial standards set forth for this area required that the sanitation districts maintain reasonably clean and clear onshore waters and for a reasonable distance offshore. However, with the increased sewage flow, the restrictions have become much more rigid to the point that the districts are currently required not only to protect the onshore waters for swimming and recreational facilities but also to protect any offshore waters that would come into contact with persons engaging in other recreational activities. The districts feel that they have complied with this requirement, especially with the new outfall that terminates in a large diffusion structure some 4,000 feet into the ocean at a depth of 235 feet.

It was noted that the sanitary survey of offshore waters is not confined specifically to bacterial populations inasmuch as these populations may be comparatively high when the water could be clear and acceptable from the standpoint of color, turbidity, grease content and floating materials. In their efforts to meet discharge requirements, the districts take motion and still color pictures of water conditions, attempt to remove all grease, solids and floating materials while processing the effluent and maintain a patrol boat to police the offshore waters.

A report presented at the San Pedro hearings by Scripps Institute personnel revealed that kelp beds formerly in the Whites Point outfall area had disappeared and have continued to recede northerly and southerly from the outfall. The essence of the report was that the death of kelp beds was primarily attributable to the presence of effluents from the outfalls in the area, the effluent acting as a toxic agent to some organisms.

The report stated in part that

> "many of the marine animals and many of the fishes which should be in the area are missing. The condition of the abalone noted in this immediate area is very poor. Apparently the progression of the effects of the outfall is that the effluent coming from the outfall is lighter than sea water due to the presence of fresh water; therefore, it floats to the surface in very direct flumes from each of the little diffuser holes along the pipes so that water below is relatively clear. At the surface a black odorous bubble can almost always be detected moving shoreward on the prevailing surface current under the influence of wind. During this action, a lot of solid material, either due to the fact that it has lost its vertical velocity or because it is flocculating, settles back down to the bottom. On the bottom these particular particles are not as dense as sand, and in the shallower water where the audible velocities of the waves are faster shoreward than they are seaward, these particles are again transported shoreward so that they join up again with the surface effluent in the inshore areas.
>
> "Below the outfall there is a number of organisms which are very prolific in this area and seem to find a ready food supply and favorable environment. These, however, are not for the most part economically important organisms. The surface water is very dirty and doesn't make favorable use for the public. Actually, the areas where the pipes have been placed are part of the very limited area the skin divers have available for recreation. These particular

rocky zones are the most productive as far as economically important marine organisms are concerned, and breaks in the pipe in the rocky areas produce a slug effect which might possibly destroy the habitat of the areas so that it would take many, many years for it to recover sufficiently to support marine life."

The Department of Fish and Game indicated that it had been quite active in examination of the areas in question as to pollution and its effects on fishlife. The department also indicated it was not satisfied with the objectives that have been set at the outer harbor at San Pedro, nor is it satisfied with the requirements that have been set for the discharges at Whites Point, and had so indicated to the board. The department stated that it did not feel that the fishlife is being adequately protected in the southern California area under present conditions, and further, that it is difficult to get the exact proof that will back up any claim of chronic and continuing pollution which it must have in filing a formal complaint with the pollution control boards under Section 481.5 of the Fish and Game Code.

With respect to the effect of sewage on marine resources, it was indicated that California has had to pioneer in this particular field and it is not anticipated that the pollution control boards will have any concrete answers to the problem for many years. A comparatively recent research program was begun in November, 1956, and to date the board has contracted with the Hancock Foundation for a total of approximately $238,000 of state funds. The board hopes that this program will be supplemented by approximately $20,000 a year from a National Institute of Health grant. The board has further contracted for about four years with Scripps Institute for a study of pollution effects on kelp, the study to cost approximately $20,000 a year. The state board has also contracted with Humboldt State College for a special study in the Humboldt Bay area and with the University of Southern California for a half-year study of oily substances on the beaches and near-shore waters.

The Los Angeles Harbor Department went on record as favoring certain limited pollution, which would reduce oxygen content in the water to eliminate the presence of many types of marine growth. Its position is based upon the cost to the department of replacing piles under harbor installations. It estimates that it replaces in the neighborhood of some 150 to 200 piles per year at a cost of about $375 to $400 apiece, the replacement being due to depredations by marine growth. The Harbor Department did not advocate oil or other objectionable floating matter, but did request a prevailing condition that would bring the oxygen count down to approximately 2 parts per million, as opposed to the present 7½ to 8 parts per million. The Harbor Department's representative indicated further that where pollution is prevalent to the extent that marine growth is curtailed, boat owners find that they do not have to paint their boats as frequently and barnacles and fouling mechanisms are nonexistent or reduced in numbers.

Representatives of skin-diving associations and independent divers pointed out that in their activities they had come across many unfavorable contamination conditions, discouraging many people from engaging in shoreline recreation.

SAN FRANCISCO BAY AND SACRAMENTO RIVER STUDIES

During the 1958 Budget Session, comprehensive water pollution investigations were proposed for the San Francisco Bay area and for the entire Sacramento River. Primary objective of the Bay study was to develop information on the effect of waste discharges upon the beneficial uses of the Bay and contiguous estuarine waters, with particular emphasis on the fishery resource. This requested 1958-59 study was divided into two parts: (1) For an industrial waste survey; and (2) for a study of fishery resources, water quality and bottom conditions. The latter study was to be part of a three-year investigation.

The purpose of the Sacramento River study was to provide the Central Valley Regional Board with reliable quantitative data on water quality in the river so that the board could: (1) accurately determine limitations to be imposed upon waste discharges into the river; and (2) have a reliable basis upon which maximum waste loadings could be apportioned to various reaches of the river.

The total appropriation requested by the state board for these two projects was $705,597. The Department of Finance recommended that this amount to be reduced to $160,000. A subsequently revised budget deleted the proposed Sacramento River study in its entirety and reduced the amount for the Bay study to $18,932 for the 1958-59 Fiscal Year. The Governor's original budget included this latter amount to be apportioned from the General Fund. The Assembly felt that the $18,932 was much too small an amount to spark the survey properly and approved an additional $40,000 appropriation from the Fish and Game Preservation Fund.

At this point in the legislative procedure a question arose over whether the Water Pollution Board or the Fish and Game Department should administer the expanded $58,932 study program. The issue was clouded by a statement from Ross E. Leffler, Assistant Secretary of the United States Department of Interior, who reported that "if California hunting and fishing license receipts are appropriated for expenditure by the State Water Pollution Control Board, and if the California Department of Fish and Game will lose control over the expenditure of those funds, a serious question will be raised as to the State's eligibility to participate in any benefits of federal aid in fish and wildlife restoration acts." In addition, California's organized sportsmen protested the diversion of fish and game funds for general pollution studies. Subsequently, the Senate amended the appropriation item to exclude the $40,000 addition and the Assembly accepted this amendment.

This committee is of the opinion that investigations of the effects of pollution in the above waters are immediately essential and absolutely necessary to the health and welfare of the general public and the improvement of conditions for fish, wildlife and general recreational purposes. The committee feels that it was regrettable that the administrative vortex in which these proposed field study appropriation items found themselves.

A proposal by this committee to renew the attempt to initiate a San Francisco Bay area and Sacramento River water pollution investigation was presented to Assemblyman Charles W. Meyers' Water Pollution Subcommittee of the Assembly Conservation, Planning and Public

Works at a December 19, 1958, meeting in San Francisco. The proposal received enthusiastic approval by the members of the subcommittee.

Findings

(1) Although heavy mineral pollution of some inland waterways has had disastrous effects on the fish resource, some of the problems in this area are being resolved through the co-operative efforts of the industry and state agencies involved;

(2) Industry and pollution control are compatible if programs of mutual understanding and education are continued;

(3) Co-operation of some logging firms is helping to eliminate undesirable practices detrimental to fish life and self-policing and education have been initiated by several firms;

(4) From testimony gathered during the interim, it is evident that the procedures required in processing pollution cases under the Dickey Act are too involved and time consuming for effecting necessary action to protect fish life in a chronic or continuing case of pollution. This is true whether the pollutant is in the form of heavy mineral leaching or timber refuse in inland streams, oil spoilage or chemical disposal in bays or sewer effluent in the ocean waters;

(5) Comprehensive water pollution investigations are urgently needed in the San Francisco Bay and the Sacramento River and the 1958 Budget appropriation of $18,932 to initiate the study was wholly inadequate;

(6) The primary responsibility for setting water standards and policing them in each area traditionally comes within the jurisdiction of the regional water pollution control boards;

(7) Any appropriation from the Fish and Game Preservation Fund for pollution study projects would seriously jeopardize the entire federal aid to wildlife program in California.

Recommendations

That a comprehensive water pollution investigation of the Sacramento River and the San Francisco Bay area be initiated under a contractual agreement, supported by an appropriation from the General Fund.

KELP HARVESTING

A somewhat limited investigation conducted from 1948 to 1954 concluded that kelp cutting does not adversely affect fisheries. In the 1956 Budget Session, specific authorization was given to initiate a study to determine the cause and effect of ocean phenomena on kelp beds and related effects on ocean fisheries. Scripps Institute of the University of California was awarded a $200,000 contract to conduct this extensive five-year investigation. Other information to be gained by this study will include such things as the relationship between kelp and its environment, possibilities of growing kelp under laboratory conditions and creating new beds, the influences of waste disposal and kelp cutting.

Although this investigation is only in its third year, testimony by scientific personnel presented to the committee reveals several tentative conclusions. For example, many types of seaweed other than commercial kelp (macrocystis) are found along Southern California beaches. In many cases, 50 to 60 percent of the beach litter is caused by these

other types and is not caused by operations of the kelp harvester, the worst of the litter being the result of heavy seas in the wake of storms, extreme water temperatures, lack of plant nutrients, predators and disease. Oceanographers point out that much more kelp seems to come ashore from unharvested beds than from those harvested periodically.

Another tentative conclusion is that, although kelp beds are extremely important to some fish species, there is no evidence that kelp harvesting damages the fishery resource inasmuch as the harvested portion does not constitute spawning or nursery grounds for any commercial or sport fish. Representative samples from various beds have shown that in unharvested beds the remaining surface canopy has shaded young growth in deeper water, effectively halting photosynthesis, the regular process by which plants create organic matter. Properly regulated harvesting of the upper canopy does have a beneficial effect on the production of organic material upon which fish depend for food.

Regarding attempts to grow kelp under laboratory conditions, Scripps personnel reported success in completing the macrocystis life cycle and in transplanting young plants into the ocean environment to observe their further growth.

The study group indicated that it would be unwise to devote much further investigatory work to the effects of kelp harvesting and that proper avenues of research ought to be concerned with basic biological and oceanographic conditions inasmuch as these factors are overwhelmingly important in controlling kelp sizes and populations. For example, it is felt that a major unknown factor is the effect of pollution. There are indications that in areas where pollution has become a problem, kelp has disappeared, although scientists working on the investigations are currently unprepared to postulate an unqualified cause-and-effect relationship.

Findings

Although incomplete data has been supplied, it would seem at this time that present methods of kelp harvesting under proper regulation do not have deleterious effects on fish life and indeed under certain conditions may enhance the kelp beds.

SKIN DIVING

At committee hearings in San Pedro, testimony presented indicated a terrific increase in California skin diving and in certain areas this relatively new sport fishery is more prevalent than rod and reel fishing. In the United States about half a million pairs of skin diving fins are sold each year with the Los Angeles area accounting for the great majority of sales. In the four years previous to 1958, 70,000 SCUBA units were sold, 40 percent of the total in the southern California area where it is estimated that approximately 200,000 skin divers live and operate. The SCUBA is a self-contained underwater breathing apparatus that many divers use.

Major species taken by the skin divers include abalone, lobster, sheep-head, calico bass, rockfish, spotted sanddab and cabezon, and it could be expected that an increase in the sport fishery would have an effect on the abundance of these species. Testimony from skin divers reflected the opinion that additional safeguards might be necessary to

protect some species, especially cabezon, sheep-head and spotted sanddab.

Regarding protection for skin divers, it was suggested that they be required to wear some identifying light-colored feature on top of their helmets since there have been instances of fishermen shooting at surfacing skin divers in the mistaken belief that they are sea lions. It was further suggested that some system of inspection be initiated on skin diving equipment since some manufacturers have issued comparatively inferior equipment that is extremely dangerous in use. A training program for budding skin divers was also mentioned, the program to be operated by an agency such as the Red Cross or YMCA that would issue a certificate upon completion of the course.

While this committee appreciates the dangers inherent in poor equipment, improper training and accidental shootings, it would seem that prior to the recommendation of legislation in this field, the skin diver associations and unattached divers should be contacted as to the possibility of initiating self-policing activities within the groups with regard to the above safety improvements. Legislation probably could be effected to these ends, but it would seem a wiser and easier course if the skin divers themselves could initiate these programs and possibly report their progress to the appropriate legislative committee.

PREDATORS

Sea Lions

One of the points in the Salmon Unlimited legislative program concerns predation on salmon by sea lions. It is the contention of this group that these sea mammals should be controlled so that their increasing numbers cannot damage the salmon resource any more than they have already. It is a fact that the sea lion population increased in California waters by 10,000 in 1958, but it is also a fact that the major increase was in southern California waters, where salmon are not present.

However, southern California fishermen also desire a control program on sea lions especially in light of the acknowledged damage they do to white sea bass and fishermen's nets. It seems that fishermen of both areas are as concerned with how much fish the sea lions actually eat as they are with the amount of damage they do to nets, lines and other gear, and the amount of hooked fish they tear and chew, thus rendering it unmarketable.

The Department of Fish and Game agrees that the population is on the increase, that the sea lions do considerable damage to hooked fish and fishing gear, but the department wants no part of a wholesale predator control program, especially one involving a bounty. It feels that the amount of public sentiment that would be arrayed against such a move would be terrific. The department now has the power to reduce the herd by humane means if it considers it to be necessary and fishermen, both commercial and sports, have the power to shoot sea lions that are doing damage to their nets or interfering with their fishing.

It should be emphasized that testimony received by the committee revealed that no one is seriously considering extermination of the sea lion population. Scientific testimony indicated the possibility of a decrease in population numbers if water conditions return to their status of two years ago and that, regardless of California's action, sea lions will continue to immigrate along the coast from Mexican waters.

Findings

(1) Sea lions are an increasing nuisance factor to commercial and sports fishermen;

(2) There is no scientific proof that sea lions' diet consists of more desirable fish than undesirable fish;

(3) Sea lions' digestive processes are such that it is extremely difficult to determine the main factors of their diet;

(4) There have never been more fish in California waters than in 1958 and there have never been more sea lions;

(5) Sea lions have high esthetic value along the coast.

Recommendation

That no intensive sea lion predator control program be initiated at the present time.

NOTE: This recommendation requires no additional legislation.

DISPOSAL OF DEAD SEA MAMMALS

During a committee hearing in Eureka in late 1958, testimony was heard regarding the problem of disposing of dead sea mammals that wash ashore on public beaches. Currently, sports and commercial fishermen have the authority to shoot at sea lions or seals doing damage to nets, tackle or fish. Although many mammals killed in this way sink to the ocean floor, some invariably wash ashore onto public beaches and their disposal presents a problem to some of the smaller coastal counties such as Del Norte, since they do not have the funds, equipment or personnel to accomplish the removal.

Material presented to the committee indicates that a number of coastal counties have methods of disposing of seals, sea lions and whales that wash ashore. The methods range from authorizing the county public works and health departments to work on a co-operative basis to the hiring of a retired poundmaster to collect the carcasses and dispose of them.

The Humboldt-Del Norte County Department of Public Health proposal that funds be made available from fish and game money for the removal of carcasses from public beaches has received the support of many California coastal counties. Sportsmen groups, however, oppose the use of the Fish and Game Preservation Fund for such a purpose.

Findings

A serious problem exists in some of the smaller coastal counties regarding the financing of the removal of dead sea mammals that wash ashore on public beaches.

Recommendation

Appropriation either from the Fish and Game Preservation Fund or from county fish and game fine money to be used for the above removal action.

NOTE: Proposed legislation implementing this recommendation appears as Appendix F and was introduced January 7, 1959, as Assembly Bill No. 68 by Mr. Belotti by request of this Committee.

FEDERAL MILITARY CLOSURES

This is a subject of relatively new status to the southern California fishermen and was presented to this committee at its November 24-25, 1958 hearing in San Pedro; consequently, the committee staff has not had an opportunity to investigate the situation. What follows, then, is a condensation of the testimony presented at the hearing.

The Federal Government has closed certain California coastal areas for experimental or training reasons and while the procedures for such closings are definite, the fishermen claim they are not being followed in many instances. The fishermen further claim that although all current closures are not complete, they account for approximately 80 percent of the fishable area in southern California.

For example, the establishment of Camp Vandenburg in Santa Barbara County has recently given rise to a mushrooming boom in the

area because of its importance as the West Coast's first missile launching and rocket base. The fishermen state that if a real emergency existed they would be the first to stay clear of the area, but that the particular coastal area contains the majority of the flatfish waters in southern California and that it is now one big closure.

Although mine-sweeping activities are published in the Coast Guard's *Notice to Mariners* the fishermen claim that difficulty exists in informing all interested persons of such activities. Other closures are arranged by the range officer at Point Mugu and the fishermen claim they must contact him daily in order to learn of new closures. In most instances, federal agencies have been co-operative, but the fishermen state that they never know in sufficient time when an area is to be closed.

The onshore movement of fish in the last few years has brought the boats closer to shore and in some instances they seem to be defying closure orders when in fact they are following schools of fish. This situation has led to understandable friction. It was pointed out that fishing times and the appearance of schools do not always correspond to or fit into the time or space limits set by the federal agencies.

One of the main points of contention is the way in which the federal agencies announce the closures. The fishermen state that many times they do not know about the closure until they arrive in the area. One example concerning San Nicholas Island was pointed out. The lobster and rock cod boats were loaded and ready to set sail before the fishermen discovered the area was closed. They claim that public hearings prior to closures being effected would do much to alleviate the situation. There seems to be a misunderstanding of purpose involved here that has led to some disrespect by the civilian population of the federal patrol boats.

Findings

(1) There is not much of a positive nature that this committee is able to do with regard to this closure situation inasmuch as the agencies involved are federal;

(2) It would seem that the commercial and sport fishermen could arrange a central contact point where the range officer would be able to send the current and latest closure orders; this information could then be disseminated to all fishermen involved;

(3) In light of the fact that this is one of the few times the commercial and sport fishermen are united in their efforts to obtain the same action on a problem, the seriousness of the closures and their effect on fishing activity should not be underestimated;

(4) It would seem, finally, that one aspect of the problem could probably be clarified if advance notice were given, when possible, to the fishermen regarding the closure of a particular area.

Recommendation

Adoption of a resolution requesting the federal authorities to hold public hearings prior to the closure of any coastal area to fishing.

NOTE: A proposed resolution implementing this recommendation appears as Appendix G and was introduced January 7, 1959, as Assembly Joint Resolution No. 1 by Mr. Pattee and Mr. Belotti by request of this committee.

RESEARCH BIBLIOGRAPHY

During the 1957 Regular Session, Assemblyman Vincent Thomas of San Pedro introduced House Resolution No. 124, requesting in effect a review of research activities of the various agencies engaged in work relating to California fish and game. It was subsequently proposed that a comprehensive bibliography be compiled of all available research papers regarding some 144 species.

The bibliography was compiled and annotated by the committee's research assistant, William F. Scheuermann, Jr., at the time a legislative intern assigned to the committee by the California Legislative Internship Program. Established in 1957, the program is sponsored jointly by the California Assembly, the Ford Foundation and the five graduate universities in the State in order to provide training not only in the legislative process but also in the general field of State Government and public policy for a small number of advanced graduate students, and to provide additional research services for the Assembly.

The bibliography was compiled during a 10-month period beginning in October, 1957, and was published by the committee in August, 1958, under the title *An Annotated Bibliography of Research in Economically Important Species of California Fish and Game.* It was in no way a critical, technical evaluation of the research material, but rather a listing of that material and a cursory evaluation of its pertinence to the bibliography. The purpose of the compilation was to make available to the Legislature a comprehensive list that could be evaluated by a competent technical authority, an evaluation that would be useful in considering future proposals for the management of California's fish and game, as well as pointing out areas that might require additional study and research.

The committee is hopeful that the bibliography might serve as a useful contribution to future California management programs for its fish and game resources.

APPENDICES

APPENDIX A

An act to amend Section 8305 of the Fish and Game Code, relating to abalones.

The people of the State of California do enact as follows:

SECTION 1. Section 8305 of the Fish and Game Code is amended to read:

8305. In Districts 6, 7, 15, 16, 17, 19A and 118, and in District 10 north of Point Lobos, and ~~in waters~~ less than ~~20 feet deep~~ 150 feet from any point on shore in other districts, it is unlawful to take abalone for commercial purposes.

APPENDIX B

An act to amend Section 8304 of, repeal Sections 8308, 8309, 8310, 8311, 8312, 8313, 8314, 8315, and 8316, inclusive, of, and add Sections 8308 and 8309 to, the Fish and Game Code, relating to red abalones.

The people of the State of California do enact as follows:

SECTION 1. Section 8304 of the Fish and Game Code is amended to read:

8304. It is unlawful to take any abalone, the shell of which, measured in greatest diameter, is less than the following specifications; red abalone, eight inches except as provided in Sections 8308 and 8309; green abalone, seven and one-quarter inches; pink abalone, six inches; black abalone, five inches.

SEC. 2. Sections 8308, 8309, 8310, 8311, 8312, 8313, 8314, 8315, and 8316 of said code are repealed.

SEC. 3. Section 8308 is added to said code, to read:

8308. Red abalones of any size may be taken in those ocean waters of the State and tidelands to high water mark, including waters adjacent to islands off the coast, lying southerly of District 18 where commercial taking of red abalones is otherwise authorized, from March 16th to January 14th or to such date prior thereto as may be determined by the commission pursuant to Section 8309.

APPENDIX C

An act to amend Section 8152 of the Fish and Game Code, relating to sardines.

The people of the State of California do enact as follows:

SECTION 1. Section 8152 of the Fish and Game Code is amended to read:

8152. Sardines may be taken at any time after June 1, ~~1959~~ 1961, for the purpose of salting, curing, smoking or drying, or for the purpose of packing in cans commonly known as quarter-pound or square cans less than 10 ounces in net weight. In such 10-ounce cans, fish of a size not less than eight to the can shall be used.

APPENDIX D

Assembly Joint Resolution—Relative to imported tuna.

WHEREAS, As expressed in Assembly Joint Resolution No. 2 of the 1958 Regular Session (Res. Ch. 59, Stats. 1958) ". . . The tuna fishing industry and the tuna canning industry are major industries of the State of California and are the chief contributing factor in maintaining California's position as the leading fishery state in the nation; and . . . The tuna fishing industry has lost a large share of its market to the severe competition from imported tuna which is introduced into this State in many forms and which is produced under standards far lower than those rightfully employed by California fishermen . . ."; and

WHEREAS, The recent increased importation of preprocessed or selectively cut portions of tuna, such as merely the loin of the fish or a cut known as "rounds" which is already in the proper shape for canning, has greatly intensified this problem not only for the fishermen and

cannery owners and employees but also the citizens of this State generally through the possible loss of this important industry; and

WHEREAS, Many attempts to remedy this situation have been presented to the Congress of the United States without effect; now, therefore, be it

Resolved by the Assembly and the Senate of the State of California, jointly, That the House of Representatives Merchant Marine and Fisheries Committee, or other appropriate committee, is respectfully requested to investigate this problem in California and to hold such hearings in California as are necessary to allow this problem to be presented to the committee by the local citizens most directly affected, and permit the Assembly Interim Fish and Game Committee of the California Legislature to attend such hearings and aid in the investigation of all possible solutions; and be it further

Resolved, That the Chief Clerk of the Assembly is directed to transmit copies of this resolution to the Speaker of the House of Representatives and to each Representative from California in the Congress of the United States.

APPENDIX E

An act to amend Section 12 of Chapter 1971 of the Statutes of 1957 and Section 325 of the Fish and Game Code, relating to deer.

The people of the State of California do enact as follows:

SECTION 1. Section 12 of Chapter 1971 of the Statutes of 1957 is amended to read:

SEC. 12. This act shall be effective until the ninety-first day after final adjournment of the ~~1959~~ *1961* Regular Session of the Legislature and thereafter shall have no force or effect, except any order or regulation made pursuant to ~~Article 1.5 (commencing at Section 1235) of Chapter 3, Part 3, Division 4 of said code, or~~ Chapter 5 (commencing with Section 450) of Division 1 of the Fish and Game Code ~~as proposed by Assembly Bill No. 616,~~ shall be operative and effective until December 31, ~~1959~~ *1961*.

SEC. 2. Section 325 of the Fish and Game Code is amended to read:

325. Whenever after due investigation the commission finds that game mammals, *other than antlerless deer*, and fur-bearing mammals and resident game birds have increased in numbers in any areas, districts, or portions thereof other than a refuge or preserve established by statute, to such an extent that a surplus exists, or to such an extent that the mammals or birds are damaging public or private property, or are overgrazing their range, the commission may provide, by regulation, for a special hunting season for the mammals and birds, additional to, or concurrent with any other open season specified by law; or provide for increased bag limits; or remove sex restrictions specified by law. *The taking of antlerless deer under this section may only be authorized if the commission determines such mammals are damaging public or private property.*

APPENDIX F

An act to add Sections 13006 and 13103 to the Fish and Game Code, relating to fish and game funds.

The people of the State of California do enact as follows:

SECTION 1. Section 13006 is added to the Fish and Game Code, to read:

13006. Expenditures may be made from the Fish and Game Preservation Fund to pay for disposing of carcasses of dead sea mammals washed upon ocean beach areas and such expenditures are declared to be for the protection, conservation, propagation, and preservation of fish, game, mollusks or crustaceans or for the administration and enforcement of laws relating thereto.

SEC. 2. Section 13103 is added to said code, to read:

13103. Expenditures may be made from the fish and game propagation fund of any county to pay for disposing of carcasses of dead sea mammals found on ocean beach areas in the county and such expenditures are declared to be for the protection, conservation, propagation, and preservation of fish, game, mollusks or crustaceans or for the administration and enforcement of laws relating thereto.

APPENDIX G

Assembly Joint Resolution—Relative to military closures.

WHEREAS, Federal governmental closing of an ever increasing area of most productive fishing waters for security reasons and for training and practice areas for the armed forces is creating a serious problem as to the use of California fishing waters; and

WHEREAS, Often the reasons for such closures are not apparent and fishermen, who otherwise respect the necessity of activities for national defense, believe such closures to be an unnecessary infringement on their activities; and

WHEREAS, While some notice is given to closures in the Coast Guard's Notice to Mariners, many people are unaware of the exact hours or areas closed and misunderstandings as to the need for such closures and their exact extent often cause unnecessary problems; and

WHEREAS, Closer co-operation between the military authorities and the fishermen would provide not only better enforcement of the closures and protect the fishermen involved but would afford an opportunity for the military authorities to consider the possible effects that any proposed closures would have on fishing in these areas of California; now, therefore, be it

Resolved by the Assembly and Senate of the State of California, jointly, That the Congress of the United States and the Secretary of Defense are requested to take all steps necessary to insure that prior to the closing of any area to fishermen by the military authorities, that a public hearing be held in the area affected, except when such closing is a matter of extreme urgency, and that all such closures be limited to

those areas and times when such closing is vital to our national defense with the reasons for such closing being made public whenever compatible with security restrictions; and be it further

Resolved, That the Chief Clerk of the Assembly is directed to transmit copies of this resolution to the President and Vice President of the United States, to the Speaker of the House of Representatives, to the Secretary of Defense, and to each Senator and Representative from California in the Congress of the United States.

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MODERNIZATION OF NONCHARTER COUNTY LAW

FINAL REPORT OF THE ASSEMBLY INTERIM COMMITTEE ON MUNICIPAL AND COUNTY GOVERNMENT

House Resolution No. 277, 1957

MEMBERS OF COMMITTEE

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LETTER OF TRANSMITTAL

HONORABLE RALPH M. BROWN
Speaker of the Assembly
State Capitol, Sacramento, California

DEAR MR. SPEAKER: The Assembly Interim Committee on Municipal and County Government submits herewith the first of a series of final reports representing work of the Committee between the 1957 and 1959 Sessions of the Legislature, according to House Resolution No. 277 of the 1957 Regular Session.

This final report represents the findings of the committee's study of a possible modernization of general law county government structure. In particular, an investigation was made as to the feasibliity of providing the county executive form of government as an alternative for non-charter counties, and the appointment of certain presently elected county officers.

Contained in this report are the findings, conclusions, and recommendations of the committee on this subject.

Respectfully submitted,

CLARK L. BRADLEY, Chairman
WILLIAM BIDDICK, JR., Vice Chairman

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ERNEST R. GEDDES
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2-L-4100

SUMMARY OF FINDINGS

The Assembly Interim Committee on Municipal and County Government conducted this investigation principally to ascertain the feasibility of proposals which would modernize noncharter county law by creating alternate forms of organization structure. In essence, the principal proposals were to: (1) provide that certain of the traditionally elected county officers may be appointed; and (2) provide for the office of county executive. Legislative authorization to adopt such governmental alternatives would obviate the necessity of charter adoption to achieve these purposes.

I. THE APPOINTMENT OF COUNTY OFFICERS

1. The law presently states, through legislative enactment, that 10 county officers in addition to the board of supervisors must be elected. They are the county clerk, recorder, tax collector, assessor, district attorney, sheriff, treasurer, coroner, public administrator, and auditor. In addition, the Legislature has required the election of the county surveyor unless the board of supervisors of the county provides by ordinance for his appointment by the board. A twelfth officer, the county superintendent of schools, is required to be an elective officer by the State Constitution.

2. The voting record for elective county officers seems to be indicative of a lack of interest in them on the part of the public. A large percentage of the incumbents run unopposed at election time. Research discloses that nearly 50 percent of the present incumbents were originally appointed by the board of supervisors due to death, resignation, etc., of the incumbent, and then the appointees nearly always remain in office by winning voter approval, often with no opposition at the following election.

3. Although the traditionally elective officers head many important departments, numerous new functions of the present-day county government, of equal or greater importance, are administered by appointive officers. Appointive officers, in fact, seem to be widely accepted as administrators for these new departments.

4. Opposition to the appointment rather than election of county officers seemed to be essentially that local government would be further removed from control of the people.

5. Proponents of the appointment theory, however, believed that the election of these officers actually reduces the effectiveness of public control since the authority of the representative body, the board of supervisors, is weakened. Also, they felt that the voters were often confused by the long ballot.

6. Witnesses generally agreed that no more than three officers should continue to remain elective, the district attorney, the assessor, and

the sheriff. Strong opinions were offered, in fact, for continued election of only one officer, the district attorney.

7. Witnesses were in general agreement that noncharter counties desire and need more centralization of authority, and that the present long list of elective county officers tends to fractionalize administrative control, reducing the overall effectiveness of county government.

II. THE COUNTY EXECUTIVE

1. The need for a professional administrator is attested to by the fact that a large number of counties have turned to the only present device available to them to achieve this end, appointment of administrative officers by ordinance or resolution of the board of supervisors.
2. Many counties have indicated that the increasingly complex nature of county government requires the strong manager form of government which is not now available to them.
3. The proposal would authorize an alternate form of government for noncharter counties similar in nature to the city manager form of government provided for noncharter cities in 1927.
4. Witnesses in general were in accord that county general law was in need of modernization so that counties would not of necessity have to resort to a charter to obtain an adequate form of organization.
5. Those testifying at the hearing generally agreed that counties should be provided with an alternate form of government which would allow them to establish a strong executive position.

RECOMMENDATIONS

On the basis of the evidence presented to the committee by witnesses in the course of the hearing, as well as research work independently conducted by the committee's staff, the following recommendations are hereby submitted:

1. The board of supervisors should have the power to provide by ordinance that the following elected county officers shall be appointed by the board:
   (a) County clerk;
   (b) Public administrator;
   (c) Tax collector;
   (d) Auditor;
   (e) Treasurer;
   (f) Recorder;
   (g) Coroner.
2. The board of supervisors by resolution, or the people by initiative methods, should have the power to submit to the voters for their decision an ordinance providing the board of supervisors with the power to appoint the following elected officers:
   (a) Sheriff;
   (b) Assessor.
3. A set of mandatory minimum qualifications should be provided by the Legislature for each county officer listed in recommendations 1 and 2, except the auditor. The qualifications for auditor as provided for in Section 26945 of the Government Code should also be made mandatory.
4. The board of supervisors by resolution, or by the people by initiative method, should have the power to submit to the voters the issue of providing by ordinance for the office of county executive. The Legislature should set forth the powers and duties of such office.
5. The district attorney should remain an elective position.

INTRODUCTION

The committee's study of organization law as it pertains to noncharter counties is the first significant study to be made of county government since that of the California Commission on County Home Rule which 28 years ago urged the State Legislature to adopt a plan for optional forms of county charters. Although no major reforms have been made in the law for many years, nevertheless, county government in California has endeavored to keep up with the tremendous needs of the fastest growing state in the Union.

Counties have increasingly added to their traditional activities a number of major functions which are in many cases now administered countywide. Some of these are public health, welfare, hospitals, tax assessment and collection, libraries, and mental health. In the unincorporated urban fringe areas counties are being called upon to provide municipal-type services of all kinds, with a necessity in many cases of having to rely on the special district device.

Only 11 of the 58 California counties have adopted charters. They are Los Angeles, Alameda, San Diego, San Francisco, Santa Clara, San Bernardino, Sacramento, San Mateo, Fresno, Butte, and Tehama. The remaining 47 counties in the general law or nonchartered county category range in size from 600 population in Sierra County to 517,000 in Orange County.

Chartered counties are granted fairly broad home rule powers that are not possessed by the nonchartered counties. Among these is the power to create the office of county executive and to provide that county officers may be appointive rather than elective. Many authorities feel that these two powers should be offered to noncharter counties on an optional basis.

The Constitution of California provides that the Legislature shall determine which county officers are required and the method of selection, by appointment or election. Only the county superintendent of schools is required by the Constitution to be an elected officer in general law counties, and there is no constitutional requirement that any of the other county officers must be elected. The Legislature has determined, however, that general law counties must elect 11 officers, which makes a total of 12 offices required to be filled by the election process.

Of this total only four offices require that the applicant need have any special qualifications, except the usual residence and citizenship requirement to be eligible for office. Thus, there is little guarantee under present law that a qualified person will be elected to administer these very important county departments.

Although the Legislature has not authorized a change in the law to provide for the office of county executive, the need for a professional administrator to assist in the increasingly complex administration of a modern county has become quite apparent. A large number of California general law counties have seen fit to appoint an administrative officer by ordinance or resolution to act as their agent in this capacity.

General law counties have in this way attempted to keep up with today's needs by creating new methods around the existing somewhat outmoded framework of law.

A number of witnesses at the Martinez hearing, after discussing the main subjects under consideration, submitted their viewpoints on an important problem which faces both charter and noncharter counties alike—how counties can better cope with the multiplicity of special districts. The facts obtained on this important subject will be included in the committee's final report on special districts.

It was the aim of this study to look at all proposals which it was felt might create a better balanced and more modern organizational framework with which noncharter county government might better fulfill its requirements.

METHOD OF INQUIRY

The committee received requests from numerous associations and counties to look into various phases of noncharter county government law, especially those phases dealing with the proposals for county executive and the appointment rather than election of many of the numerous county officials in this classification as now required by law.

The committee requested and received testimony from representatives of county government, state associations composed of county supervisors and county elected officials, taxpayer groups, property owners associations, universities, and interested individuals. After advance conferences, programming, and notification by letter and through the local newspapers and news services to all interested parties known to the committee, a hearing was held in the City of Martinez, Contra Costa County, on June 6, 1958. Each letter of invitation sent out by the committee contained an outline of a proposal to authorize the county executive form of government as an alternative for noncharter counties. This proposal followed the tentative thoughts of a study group of the County Supervisors Association of California which has been considering the problem. It was included in the letters of invitation to stimulate thinking and to create an air of interest for the hearing.

A transcript of the proceedings was later published and distributed to the public in July, 1958.

REPORT

The principal subjects under consideration by the committee in its study of the general law pertaining to noncharter counties was a proposal to establish, as an alternative, the county executive form of government, and to provide that certain of the traditionally elective offices could be made appointive if so desired. It was felt by advocates of the proposal that the term "executive" as opposed to "manager" should be used so that a distinction could be created in the minds of the public between the manager of a city and the manager of a county. Thus, the term "county executive" has been used throughout this report.

A proposal for authorizing the "county executive form of government"[1] which included both of these features had been distributed to interested parties prior to the Martinez hearing in order to stimulate discussion of the subject. Therefore, much of the testimony was devoted to the individual aspects of the proposal.

1. *Appointment of County Officers*

The more controversial subject under consideration was the possibility of providing, as a major feature of the proposal, that certain of the presently elected officers could be appointed by the board of supervisors after, of course, the voters had approved such offices for appointment.

The Legislature now requires that ten (10) county offices shall be elective, in addition to the board of supervisors, in a noncharter county.[2] They are the offices of district attorney, sheriff, county clerk, auditor, treasurer, recorder, tax collector, assessor, public administrator, and coroner. The Legislature also requires the office of county surveyor to be elective unless the board of supervisors adopts an ordinance providing for the appointment of the surveyor by the board. One additional office, that of county superintendent of schools, is required to be elective by the State Constitution.

The board of supervisors has been granted authority to remove certain functions from some of the elective county officers and to add functions to them which provides the board with a measure of the much desired organizational flexibility. For example, any board of supervisors may establish the office of county counsel and by so doing remove from the office of district attorney all responsibility for civil matters of the county. They may also transfer the collection of unsecured property taxes from the office of assessor to the office of the tax collector, and by ordinance add to the duties of a county auditor the additional function of controller.

There are 19 different combinations authorized, so that one elective officer might fill up to three positions.[3] Some of these combinations are sheriff-tax collector, auditor-recorder, treasurer-assessor-tax collector,

[1] Appendix I, Proposal for an Executive Form of County Government.
[2] Government Code, Section 24009.
[3] Government Code, Section 24304.

and the two most commonly used combinations of coroner-public administrator and treasurer-tax collector.

It seems significant that only four of the numerous elected county officers need have special qualifications except the usual residence and citizenship requirements in order to be eligible to the offices. The district attorney must have been admitted to practice in the Supreme Court of the State.[4] The county auditor may be required by the board of supervisors to possess a certificate issued by the California State Board of Accountancy or a valid certificate of graduation from a school of accountancy or have served as a deputy county auditor for not less than three years.[5] The county surveyor must be a licensed land surveyor or registered civil engineer.[6] In addition, the county superintendent of schools must have certain educational credentials.[7] Due to the complete lack of qualifications as to education, experience, etc., for the other nine elective offices, it is conceivable that completely unqualified people could be elected to these important administrative positions due to popularity rather than ability.

There were divergent viewpoints given by witnesses at the hearing as to the specific officers that should remain elective. The proponents of reducing the number of elected officers were in agreement that probably no more than three, the district attorney, assessor, and the sheriff, should remain elective. But even these officers seemed to be debatable; the district attorney was the only county officer that all seemed to reach agreement on and felt should remain an elective position.

The fact that by appointing most of these county officers local government would be further removed from the control of the people was brought out by those opposing this provision. A number of comments from recorders answering the questionnaire sent to them by their association were read into the record by their representative, Jack Brown. Typical of these comments was one which stated:

> "* * * This constitutes full surrender of the people's most precious right as American citizens—the right of free franchise in free elections. Not only would the voter lose his right to vote for these officers, but also his right to recall such officers."

It was Mr. Brown's opinion that the great majority of his association members were opposed to any legislation that might tend to require that certain county officers presently elected by appointive.

It was felt by others that the popular assumption that local control is achieved by electing a large number of county officers is not always so since the record shows that many of these officers are re-elected year after year with no opposition.

The County Supervisors Association recently conducted a survey of counties in California in an effort to determine the amount of election opposition that incumbent officers have. The results clearly indicate that many of the so-called "historic" officers in county government are noncontroversial as far as the public is concerned. The high ratio of candidates without opposition in the June, 1958, primary as shown in the following chart supports this assumption.

[4] Government Code, Section 24002.
[5] Government Code, Section 26945.
[6] Government Code, Section 27550.
[7] Education Code, Section 400.1.

Elective office	*Candidates without opposition*	*Candidates with opposition*
Treasurer	43	10
Recorder	41	13
County clerk	40	14
Tax collector	39	15
Auditor	38	15
District attorney	36	20
Public administrator	34	14
Assessor	33	24
Coroner	32	19
Sheriff	22	35

In contrast, out of the 123 incumbent county supervisors running for re-election, only 25 had no opposition. For this reason many people can see no reason for continuing to retain such noncontroversial offices in the elective category.

Mr. William MacDougall, General Manager of the County Supervisors Association, stated that the association at present considers only those offices of county clerk, auditor, treasurer, recorder, coroner, tax collector, surveyor, and public administrator as being in the category of appointive offices. Each of these offices is now appointive in one or more of the charter counties, and, under the proposal, the people could make any, all, or none of these offices appointive. He testified as follows:

> "The question has been asked why is not the assessor, the district attorney, and the sheriff included? The answer to that is that with this alternative available to a chartered county, not a single chartered county has chosen to include those three offices as appointive."

Many are of the opinion that public control can be better achieved and insured through the elected board of supervisors which should be charged with the full responsibility of the proper administration of the county. Mr. Stanley Scott, Bureau of Public Administration, University of California, testified that:

> "Separate election of these officers reduces the effectiveness of democratic control in two ways: (1) it weakens the authority of the representative body, the board of supervisors; and (2) it confuses the voter by confronting him with an unreasonably long ballot at election time."

Another argument supporting the theory of appointment of county offices is that the tasks of the elected county officials, except for the supervisors, are primarily administrative in character rather than political. The elective county offices are filled by a process appropriate for an official whose primary duty is to represent, not according to the person's knowledge of the functions of the department or his ability as an administrator.

Mr. M. D. Tarshes, Sacramento County Executive, stated that there are only four elected officials in his charter county: the auditor, sheriff, district attorney, and assessor. It was his opinion that there is no need for even this many elected officials, and that of these four a good case

to remain an elective office could only be made for one department head, the district attorney.

In discussing this controversial subject, he stated:

> "* * * It is often said that people retain more control over the affairs of government if they elect more officials. * * * The way for the people to achieve control over their local government is through establishing in fact a board with centralized political responsibility. This, I think, is a way to avoid confusion; this is the way for the people * * * to be able to really be assured of a clear-cut type of democratic approach to their local government."

It was argued by several that those counties desiring to appoint most of their officials and provide for a strong county executive should perhaps adopt a charter, rather than set up an alternate form of government for the general law county.

Alvin Burton, representing the Citizens League of Contra Costa County, agreed that the machinery for writing a charter is excellent as it now stands, but cited two basic reasons for not desiring this type of reorganization: (1) it is difficult to arouse citizen interest which is required to make the big charter effort; and (2) the sort of document that would result from the committee of 15 freeholders, whose identities and abilities are unknown, could be a questionable factor.

The drafting of alternative general law provisions was felt by Mr. Scott to be much more desirable than a charter drafted by a board of freeholders. His reason for this viewpoint was stated in his testimony as follows:

> "Unless the drafting is done with extreme care ambiguous language may be written in or new phrases used which will be difficult for future legal advisers and judges to interpret. The optional laws could be prepared after careful study by such groups as this interim committee, and using the finest legal talent in the State. There would thus be greater assurance of a top flight technical job of drafting than when this responsibility is left to a lay board of 15 citizens in each county."

This feature of the proposal would only grant general law counties something that general law cities now have. Through the years cities have been authorized to appoint more and more of their officers until, at present, only the city clerk, treasurer, and the council are required to be elected. Furthermore, even the city clerk and treasurer can be made appointive offices by (1) providing for this in the original incorporation petition, which after approval by the voters is automatically effected; and (2) submitting the proposal at a municipal or special election.

The tentative proposal of the County Supervisors Association study group differs from related authorization provided for municipalities by the Legislature in several respects. First, the county executive form of government would have to be adopted by the people in order to change the method of selecting their county officers from the group of elected county officers authorized by the Legislature to be appointive positions and then voter approval obtained. In this manner, the people

could obtain appointment status for none, some, or all of the officers placed in this category, but only if they establish the office of county executive.

There seems to be divided opinion among administrative officers and supervisors as to the practicability of including both of these aspects in a single proposal. Many feel that the voters might desire one feature and not the other. For example, counties with established administrative officers might be reluctant to change to the strong executive approach, although they might desire to appoint their county officers. Conversely, there might be a desire in some counties to adopt the strong executive concept but retain their present method of selecting their county officers by election.

The desirability of appointing, rather than electing, the coroner was investigated in 1955 by a subcommittee of the Assembly Interim Committee on Public Health. A final report on this subject stated that in this committee's opinion "the office of coroner was a technical one requiring administrative ability and some specialized training" and that "such an office should be filled on the basis of qualification rather than ability to win voter support." [8] It should be noted that a number of the witnesses at the Martinez hearing applied this same reasoning to a vast majority of the other elective county officers.

In summation, the election vs. appointment method of selecting county officers has received considerable attention in recent years. Many believe that these positions are not policy-setting but predominantly administrative. Also, that the election of these officers tends to fractionate county administration. Testimony supported the theory that the public would be better served and actually have more local control by authorizing county supervisors to appoint these officers so that noncharter county organization could operate as an integral centralized unit of government according to accepted modern management practices.

2. *County Executive*

A second major feature of the proposal was to establish the position of county executive so that noncharter counties might have the same type of management that general law cities were authorized to have as an alternative back in 1927.

The adoption of the plan would enable them to provide their executive with strong administrative powers, which is a widely used concept in industry, municipal government, and in a number of counties in the eight states that have adopted this plan. Out of California's 352 cities, about 217 have provided for some form of centralized management, and approximately 65 percent of these have established the strong manager position.

Counties in recent years have also recognized that the increased complexity of their local unit of government called for professional management assistance. Therefore, the board of supervisors in 33 out of the State's 58 counties have attempted to solve this need by appointing an administrative officer (sometimes called chief administrative officer,

[8] Assembly Interim Committee on Public Health, Report of the Subcommittee on California's Coroner System (Sacramento, Assembly of the State of California, 1955), page 9.

county executive, administrative assistant, etc.) to act in a managerial capacity. However, noncharter counties are not able to fully utilize the services of their administrative officers due to the fact that they can only be agents of the board of supervisors, appointed by resolution or ordinance, and are without the powers usually associated with such a position in keeping with modern practices.

While, generally speaking, the responsibilities given to the administrative officers in noncharter counties are similar to those given the city and charter county administrators, this method of appointment usually provides: (1) a lesser degree of management authority; (2) a lesser degree of permanency since the office is created and can be abandoned by the board of supervisors—and perhaps most significant; (3) a lesser degree of control over county functions due to the eight or more elective department heads. The latter point relates to a second principal phase of the proposal which will be discussed subsequently in the report.

Generally speaking, witnesses were in accord with the adoption of this aspect of the county executive form of government for noncharter counties. In fact, only the representative of the County Recorders' Association, Jack Brown, was in total opposition. He testified that the majority of the recorders were not in favor of the proposed plan for a county executive. Opinions were obtained from county recorders through the use of a questionnaire patterned after the one prepared by the County Auditors' Association. In his testimony concerning the proposal for a county executive Mr. Brown stated that:

> "1. Recorders in general law counties were uniformly opposed to any change in law that would authorize adoption of an ordinance establishing an executive form of county government. * * *"
>
> "2. * * * the county executive should not be authorized to prepare the annual county budget. * * * should not be responsible for administration of the budget and for enforcement of policies, rules, and regulations, and ordinances of the board of supervisors relating to the administration of offices, institutions and departments of the county."

Almost the exact opposite of this viewpoint was expressed by Harry L. Morrison, Executive Director of the Contra Costa Taxpayers' Association. It was Mr. Morrison's opinion that the county executive should have each of the above duties. In addition, he felt that the county executive form of government should be adopted by ordinance of the board of supervisors without submission of this action to the people, which is a power granted general law cities in adopting the city manager form of government.

The president of the County Auditor's Association also supported the proposal. Mr. Howard McNamer stated that auditors replying to their questionnaire were somewhat divided in their voting. The larger counties in population supported the executive plan, while the smaller counties which generally have not had the opportunity of working with administrative officers tended to oppose it.

Due to the increased assumption by county government of many municipal-type services, as well as an expansion of the traditional county functions, it was felt by many of the witnesses that a more cen-

tralized administration is necessary in county government today. Mr. Tarshes, County Executive of Sacramento County, made the following statement at the hearing:

> "I believe very firmly, very faithfully, in the value of a county executive type of position; not because I think there is any particular magic in this business of administration, although there are certain techniques and experiences which are certainly valuable, but because I think it is evident that county government is the most complex unit of local government. * * * I think it is essential to have some centralization of administration, that it is essential to have co-ordination, that it is essential, I think, to have the elected governing board of the county have a maximum amount to say about the way in which that government shall be organized to perform the duties that it is responsible for."

It seems apparent that the county executive feature of the proposal does not provide any radical change from the presently available administrative officer concept. However, it would strengthen the position of the administrator as already described in those counties desiring to adopt this alternative. It provides general law counties with the same alternate procedure that is authorized for general law cities. The proposal would not be unique to county government since there has been precedence established in several other states.

APPENDIX A

LIST OF WITNESS RECOMMENDATIONS

1. Provide, as an alternative, the county executive form of government for noncharter counties *as proposed.*
2. Provide, as an alternative, that counties may establish the office of county executive.
3. Provide that those counties adopting the county executive form of government may appoint any or all of certain specified county officers that are presently elected.
4. Provide as an alternative that counties may appoint certain of the presently elective officers.
5. Offices most often suggested to remain in the category of *elective* were:
   (a) District attorney, assessor, and sheriff;
   (b) District attorney and assessor;
   (c) District attorney.
6. Establish a set of "qualifications" for each office placed in the permissive appointment category.
7. Authorize the board of supervisors to adopt the county executive form of government without submission to the voters.
8. Require a two-thirds vote rather than a majority vote for adoption of the alternate form of government.
9. Authorize those offices left in the category of "elective" to be made appointive if so ordered by a vote of the people.
10. Provide the board of supervisors with the power to consolidate or eliminate appointive offices.
11. Permit a change in the number of supervisors, subject to approval by the voters.
12. Permit supervisors to be elected at large rather than by district, subject to approval by the voters.
13. Permit boards of supervisors to make the position of constable and marshal appointive, and make these positions responsible to the county sheriff.
14. Permit county grand juries to employ staff to assist in their studies of local government.
15. Allow boards of supervisors to prepare and submit charters directly to the voters without the necessity of calling for an election of a board of freeholders.
16. Include provisions in the county service area law to authorize capital outlay financing, and a better calendar for adoption.

APPENDIX B

HEARING

City of Martinez—June 6, 1958

Subject:

Discussion of a possible alternate structure that would authorize noncharter counties to adopt the executive form of county government, and other means of modernizing county government law.

PROPOSAL FOR AN EXECUTIVE FORM OF GENERAL LAW COUNTY GOVERNMENT

1. Should the counties be authorized to adopt an ordinance establishing an executive form of county government:
   (a) Submitted to the electors by the board of supervisors at any general or special election; or
   (b) Submitted by the people as an initiative measure.

2. Should the county executive be authorized to prepare the annual county budget and be responsible for its administration after adoption? Should he also be authorized to enforce the policies, rules, regulations and ordinances of the board of supervisors relating to the administration of the offices, institutions and departments of the county, and perform such other duties as the board of supervisors may require of him?

3. Should the counties be authorized to provide in the ordinance that, as an alternative, certain of the presently elected county officers—except the supervisors and perhaps two or three other officers—may be appointive rather than elective?

   If certain officers are made appointive, should the appointments to such offices be made by the board of supervisors unless the board vests such power in the county executive by ordinance? (Appointments of such officers could be made at the expiration of the terms of the officers then in office, and on a vacancy in any such office.)

   Should the appointments to such offices be made according to merit and fitness from eligible lists established in accordance with rules adopted by the board of supervisors prior to the submission of the ordinance to the electors?

   Should the appointive officers hold office at the pleasure of the board of supervisors?

4. Should the proposition appear on the ballot as "shall Ordinance No. __ . providing for an executive form of county government be adopted?" followed by the words "yes" or "no."
   Should a majority of the votes cast for the ordinance be sufficient for adoption?
   Should any county adopting the executive form of county government be authorized to abolish it in the same manner?

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Problems of Local Government Resulting From the *Hall* vs. *City of Taft* Case Decision

FINAL REPORT OF THE ASSEMBLY INTERIM COMMITTEE ON MUNICIPAL AND COUNTY GOVERNMENT

House Resolution No. 277, 1957

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LETTER OF TRANSMITTAL

HONORABLE RALPH M. BROWN
Speaker of the Assembly
State Capitol, Sacramento, California

DEAR MR. SPEAKER: The Assembly Interim Committee on Municipal and County Government submits herewith the second in a series of final reports representing a field of study by the committee between the 1957 and 1959 Regular Sessions of the Legislature, according to House Resolution No. 277 of the 1957 Regular Legislative Session.

This final report pertains to the committee's study on the subject of the problems resulting from the State Supreme Court decision in the case of *Hall* v. *City of Taft*.

Contained in the report are findings, conclusions, and recommendations of the committee on this subject.

Respectfully submitted,

CLARK L. BRADLEY
Chairman
WILLIAM BIDDICK, JR.
Vice Chairman
CARL A. BRITSCHGI
ERNEST R. GEDDES
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CHAPTER I

INTRODUCTION

The purpose of the committee's study on the subject of the State Supreme Court decision in the case of *Hall* vs. *City of Taft* (October, 1956) [1] was to inquire into the problems arising out of regulatory and inspection powers pertaining to school construction, as well as an inquiry into the overall problems of a possible complete immunity from local regulations by those governmental agencies which might be termed "local agencies of the State." [2] Testimony at the hearing was principally centered around the problem of the inspection and regulation of school construction since this was the issue involved in the *Hall* vs. *Taft* case.

A. *The Hall vs. City of Taft Decision*

In 1955 a building contractor by the name of Guy Hall failed to reach agreement with the City of Taft as to whether the city's building code was applicable to a school building that Hall was constructing inside the city limits. Their differences were taken to the Superior Court and the city was enjoined from applying its building code. On appeal, the District Court of Appeal reversed the decision. However, the Supreme Court later affirmed the judgment of the Superior Court and held that public schools are a matter of statewide, rather than local or municipal concern, and that the establishment, regulation, and operation of schools are covered by the California Constitution. The decision held that the Constitution makes the State of California sovereign in this field and delegates to the Legislature of the State of California plenary powers; having these plenary powers, the Legislature has pre-empted the field and, therefore, local municipal corporations cannot pass rules or regulations affecting schools. Mr. Lewis Keller, Associate Counsel, League of California Cities, testified at the hearing that the court based its holding on two grounds:

> "The first ground was that since school districts are agencies of the State for the local operation of the State school system, such sovereign activities are not subject to local regulations unless the Constitution or the Legislature has consented to such regulation, and Section 11 of Article XI of the State Constitution should not be considered as conferring such powers on local governmental agencies. As an additional ground, the Supreme Court reviewed the statutory history of State regulation of school construction and concluded that the State had completely occupied the field by 'general laws.' Local regulation of school district construction was, therefore, in 'conflict' with such laws and invalid."

B. *Separation of the Problem*

Although the court case involved only the subject of school construction, the decision seems to have indirectly involved additional concepts of major concern to local government. Therefore, the report will be divided into three parts dealing with the subjects of: (1) school construction; (2) zoning; and (3) the immunity of other special districts from regulatory powers of local government.

[1] *Hall* vs. *City of Taft*, 47 Cal. 2d 177, 302 Pac. 2d 574.
[2] See Appendix A.

CHAPTER II

SCHOOL BUILDING CONSTRUCTION IN CALIFORNIA: REGULATORY POWERS

The problem of whether school districts in constructing school buildings should be subject to municipal and county regulations was a principal issue before the committee. Cities seemed to believe that all construction other than school buildings within their jurisdiction should be subject to local regulation, and school construction should, at the very least, be subject to supplemental regulations where the local standards are higher than those set by the State.

EXISTING STATE REGULATIONS CONTROLLING SCHOOL CONSTRUCTION

School construction is quite rigidly regulated in the State of California, principally through the provisions of the Field Act.[3] Under this act, all plans for school facilities must be reviewed and approved by the Division of Architecture of the State Department of Public Works, and it further requires that the construction of school facilities be supervised by the same division. Another requisite is that all plans must be prepared by a certified architect or structural engineer who is also charged with the responsibility of providing architectural supervision.

In addition to the requirements of the Field Act, there are a number of other laws which provide for similar controls by the State Department of Education. This department has been charged with the following responsibilities: (1) advise the governing board of each school district on the acquisition of new school sites; (2) establish standards for school buildings; (3) review all plans and specifications for buildings in every district required to submit plans and specifications therefor to it for approval; and (4) review and approve plans for school construction in all but city districts, and under the provisions of the State School Building Aid Law to approve the plans and specifications of all applicant districts.[4] Building regulations have been adopted by the State Division of Architecture and, of course, are required to be followed by school districts in the construction of their schools.

It can readily be seen that the State has assumed almost complete control over school building construction. Plans must be approved by two state agencies; plans must be prepared by a licensed architect or structural engineer; site locations must be submitted for recommendations to the Department of Education and then must be submitted to the local government for their recommendations; and, finally, continuous inspection is required of each school district by an on-the-job inspector hired by the school district subject to approval of the State Division of Architecture.

[3] Education Code, Section 18199.
[4] Education Code, Section 18102 (a, b, c).

THE INSPECTION PROCESS

As indicated in the preceding section, state law provides for several different methods of inspection of school construction. Entering into the inspection process are the resident inspector, the architect or engineer, the State Division of Architecture, and, in some cases, local jurisdictions.

Resident Inspector

A major portion of the inspection process is carried out by a resident inspector who is hired by the school district and assigned to a particular school to provide day-to-day inspection. The qualifications of each resident inspector must be approved by the State Division of Architecture as well as the job architect.

A major concern of those testifying was the inability of many of these inspectors to provide adequate inspection for all phases of construction. Many felt that the smaller school districts could not afford to hire adequate all-around inspectors or specialists with a knowledge of electrical and mechanical installations. It was generally conceded that the quality of this phase of inspection varied greatly between districts. This factor was brought out by Ernest G. Kramm, Manager, Northern California Chapter of the National Electrical Contractors Association:

> "It can be clearly stated that the clerk of the works, who is employed by the small local school district to furnish inspection, is unlikely to be qualified to inspect an electrical and mechanical installation, a fact that is attributable to the civil service requirements in the selection of candidates for these positions. They have in the past been chosen solely on the basis of their ability to pass an examination as to competency in the field of structural engineering, so as to satisfy the specific requirement of the Field Act. The larger school districts have seen fit to add competent men in specialized fields of electrical and mechanical work to their inspection facilities. The smaller school districts can't afford to, and there is little likelihood in the nature of things that the small school districts will ever be able to afford more than one inspector. This all leads us to the conclusion that qualified technical personnel must be made available through some source."

It seems apparent that the resident inspectors are not adequate in many areas, leaving a void in the inspection process, especially in the technical fields of electrical and mechanical installations.

Supplemental Inspection

Previous to the Taft case, this void in inspection was to some extent alleviated by at least part-time inspection as provided by local jurisdictions, if they had inspection facilities available. Also, the Division of Architecture attempts to fill any voids since they have been charged with the responsibility of seeing that school buildings are properly constructed.

One of the essential aspects of the problem of school construction inspection resulting from the Taft case decision has centered around the withdrawal of city and county inspection agencies which were assisting

school districts in their inspection programs. The extent to which local jurisdictions were assisting school districts was a matter of conjecture. In the larger cities and some of the more populous counties it seems they were assisting a good deal, at least in the electrical and mechanical fields. Many of the cities and counties which were providing this service felt the Taft case decision left them without the authorization to perform this service.

Mr. Herd of the Division of Architecture testified that the electrical and mechanical situation was not suddenly generated in November of 1956, however:

> "It has been a matter of controversy to some extent, and perhaps confusion, for many years, but the situation was aggravated by the sudden pullout of the majority of the local mechanical and electrical inspection services that the cities and counties furnished in those areas where they were equipped to do so. At least they furnished them on a partial oncall basis. This sudden pullout aggravated the situation to a considerable extent."

Witnesses stressed the fact that the so-called "pullout" did not affect most of the smaller districts, which of course have the greatest problem of trying to provide adequate inspection, the reason being that more often than not they are located outside the jurisdiction of the larger cities in unincorporated area, and only about one-half the counties are providing inspection services of any type. Mr. Herd agreed that building inspection as rendered by those jurisdictions which do provide the function range in quality from excellent to zero.

Following this same line of reasoning was Dr. Nolan D. Pulliam, President, California School Administrators:

> "The only change that I could see that was brought about affecting the rural districts over the situation that existed before is that by implication at least it has placed upon the Division of Architecture a responsibility for carrying on this complete program of inspection, including electrical and mechanical, which apparently they had not accepted as their responsibility before; but the counties, as I understand it, at least a great proportion of them, probably are not prepared to accept this responsibility."

Also in agreement was Melton Ferris, representing the Architects Association, who stated that:

> "We certainly concur with all of those who have testified that the poor conditions of inspection in certain counties and certain areas of the State existed before the Taft case and continued to exist to some degree, certainly, after the Taft case."

Several of the witnesses representing associations in the construction and school administration fields believed that the common practice of school districts has been to check with local jurisdictions on such items as site location and zoning, street access, utilities, etc. By so doing, school districts have generally enjoyed fine co-operation with cities and counties, often receive their assistance, and try to conform to their regulations and suggestions.

Mr. Herd brought out the problem of building permit fees that are normally charged to recipients of inspection services provided by cities and counties. He continued his testimony as follows:

> " * * * Frankly, there has been considerable confusion in many jurisdictions over this Taft case, and many areas that furnish supervision even without fee—and certainly there is no uniformity as to whether fees were charged or not for inspection services—have stopped giving this supervision. Los Angeles County, for instance, pulled out of the inspection field on schools some seven or eight years ago. We have been operating there in the meantime.
>
> "In Contra Costa County, the District Attorney has said that school districts cannot pay building permit inspection fees, but still the county furnishes that inspection. I know in areas down the peninsula those services are available. I think inspection is very helpful no matter where you find it. The point is to make sure you get inspection. * * * "

It seems fairly conclusive that the Taft case pointed out the inadequacy, but did not change the situation in a majority of the areas, since most of the smaller districts were not receiving this service from local jurisdictions.

According to state law, the Division of Architecture is charged with the overall responsibility for the inspection of school construction. The division normally provides supervisory inspection to districts with an adequate inspection program and tries to take up the slack by more detailed inspection in the districts with inadequate inspection facilities. Testimony revealed that the division is not provided with sufficient funds to hire the necessary staff to carry out the more detailed inspection especially needed in the electrical and mechanical fields in many areas. If adequate inspection facilities are available in a particular jurisdiction, it would seem, however, that it would eliminate duplication of inspection staff if such facilities could be used for supervisory inspection.

Among others, Ernest Kramm suggested that the Legislature could authorize local jurisdictions to provide inspection services to school districts, but "certain criteria must be developed whereby the State can determine whether the city has competent inspection facilities. It should be recognized that only 30 percent or so of the incorporated cities of California and the counties have inspection facilities reasonably competent for inspection in each of the separate fields of structural, electrical, and mechanical work."

This suggestion raised another problem area since the Division of Architecture representative believed it would be most difficult to put into practice. Mr. Herd was asked if his department could operate efficiently if a state Legislative act were to establish a procedure similar to that of the State Fire Marshal's Office or the Division of Industrial Safety, so that cities and counties would be required to meet a minimum standard, and those that meet the minimum standard could then carry on the inspection work in regard to school construction. If the city or county failed to meet that standard, as determined by the State Department of Architecture, the State would operate the inspection of schools in that jurisdiction. Mr. Herd answered that he would hate to be the

one who grades the quality of inspection in the various jurisdictions, and that he thought this would present a great deal of administrative trouble.

The State would also have to provide that school districts would be required to pay fees to the local jurisdiction providing inspection services for school construction so that the cities would make their services available. If was felt that fees should be paid only to those jurisdictions that the State would determine to have adequate inspection facilities.

The job architect or engineer is also given a responsibility in the inspection process. The architect must see that the quality of workmanship and material used is according to the plans and specifications drawn by him. Under the law he definitely shares certain responsibilities with the Division of Architecture, with the general contractors, and with the resident inspector of the school district.

School District Immunity From Local Regulation

A principal aspect of the Taft case is the question of whether local ordinances or those set by the State should regulate school construction. The Taft decision, of course, left no doubt that the present law provides school districts with an immunity from local regulation in the construction of schools.

Many witnesses agreed that there should be no change in this policy. They pointed out that probably only 30 percent of the local jurisdictions had adequate codes. Even though many have adopted the Uniform Building Codes, changes are made in them from time to time and cities and counties quite often do not adopt the newest code. Also, many jurisdictions find it to their advantage to subtract from the Uniform Building Codes certain provisions that they do not agree with or add certain other provisions that they feel are desirable. Therefore, even though neighboring jurisdictions have adopted the uniform codes, there could be numerous differences.

Assemblyman Biddick noted that the City of Stockton had a uniform building code, plumbing and electrical codes, etc., but now the Hall vs. City of Taft decision says that these things are the responsibility of the State. Mr. Herd was asked if the State has definite detailed standards comparative to these local codes to cover mechanical and plumbing and electrical phases, to which he replied as follows:

> "Yes, sir, in plumbing, for instance, Title 21 of the California Administrative Code, which is the school design and construction code, refers to the uniform plumbing code of the Western Plumbing Officials, by reference, as a guide. Likewise, it refers to the National Electric Code and to the electrical safety orders of the Division of Industrial Safety—so essentially they operate under the same provisions."

Therefore, it would seem that the State has established a set of building regulations completely adequate to control school construction in conformity with legislative intent.

School construction, however, was placed in a separate category by most witnesses from other local agencies of the State. The amount of state control over school construction was cited by those testifying as being the principal factor for considering them separately.

Mr. Hall stated his opinion on why school construction should remain regulated by the State as follows:

> "Education is a state function in which the State has an intense interest. That was sustained again by the decision in the *Taft* case.
>
> " * * * They (the school districts) derive their powers from the Legislature and in the field of school construction they have been subject to the control of the Legislature rather than the control of local municipal or county agencies.
>
> " * * * This arrangement has been adopted to provide for equal educational opportunity and safety for pupils regardless of where they may reside. It has served to provide the guarantee of adequate educational planning and safety for all school construction and has been a statewide benefit.
>
> "There are a number of instances in which the statewide standards are in conflict with the planning and construction standards of certain local areas. In these instances it is the inclination of local governing boards to subscribe to the local standards. Since these are in addition to the general statewide standards, no great harm to educational planning or safety in construction results. Although the law permits governing boards to ignore local standards, the tendency has been, generally, to comply with them—even sometimes at the sacrifice of additional expense, time, and inconvenience."

If school districts were made to conform to local regulations, it was felt that complete uniformity could not be guaranteed due to the many differences in codes, and most witnesses agreed that uniformity was desirable in school construction in order to attain a high level of safety. However, the possibility of empowering local jurisdictions to enforce ordinances which set higher standards, i.e., supplemental regulation, was felt by several witnesses to be desirable. This aspect received much discussion by witnesses at the hearing.

The city representatives, in general, favored such legislative authorization. Typical of the testimony in favor of supplementary regulation was that of Allan Grimes, City Attorney of Modesto, who testified as follows:

> " * * * I do not think that reasonable men could conclude that the Legislature could visualize in advance every type of need, based on local community requirements and enact legislation with that much wisdom. It would be a great thing, were it possible, and we could do a lot better in cities with legislation if we had such wisdom, but I have not been able to see it or to find it and, therefore, there should be left the opportunity for supplementary reasonable regulations."

Taking the opposite viewpoint was Mr. Perry, Deputy Attorney General, who felt that the State should have complete jurisdiction over this matter. In support of his viewpoint he cited an example to the committee of a problem that occurred in a state building rather than school construction. He testified as follows:

> " * * * At the precise time that the Hall case was being presented to the Supreme Court, the State Architect had a state build-

ing in the planned stage. It was to have been steel construction. Local building ordinances were of such character that the weight of steel on that one office building would have cost more than a half million dollars over the requirements that the State Architect had determined were necessary for absolute safety. Now we would take the view that the city could not compel us to use the heavier weight of steel but we could not turn around and say to the city because we are using a lighter weight of steel you are going to have move your sidewalk over six feet so that we have an additional space within which to shore—or something of that kind. * * *''

'' * * * You might say it's mutually exclusive. We have taken the view the city cannot force us to do something and we can't force the city to do it either.''

Generally speaking, representatives of the architects, the construction industry, school districts, the Department of Education, the Attorney General's Office, and the Division of Architecture, agreed that there should only be one set of regulations that apply to school construction —those established by the Division of Architecture. It was believed that construction must be standardized statewide in order to meet the high safety requirements felt necessary for school construction. It was also believed that too much confusion would result as well as unnecessary delays and expense of construction if cities and counties were empowered to enforce their own codes.

The immunity of school districts from local regulatory powers seemed to be palatable to cities, but the application of this immunity by other local agencies of the State, most of which are completely unregulated by the State, seemed to create a great deal of concern on the part of cities. Mr. Keller spoke of his concern over this situation:

''California cities now ask how many other kinds of local districts created under state law, many of which are supervised to some extent by the State and which receive funds from the State, will be considered agencies of the State for the local performance of state functions.''

CHAPTER III

ZONING

One of the indirect results of the Taft case decision was reflected in the field of local zoning, stemming from a dispute in the town of Atherton between the town officials and school district officials. The problem arose when the town of Atherton, an incorporated city, passed an interim zoning ordinance prohibiting additional school construction pending a study.

W. C. Black, City Attorney in Atherton, explained his city's reason for the ordinance in testifying at the hearing:

> "We have more schools and more students per capita than any other city or town in the United States, so you can't say that we are against education. In our particular case we have a population of about 7,000; we have 11 schools in the town of Atherton, and we have almost 7,000 students. We feel that there ought to be some control somewhere at some point along the line where we would be able to have some control over additional students. So, when a school district passed a resolution of necessity saying that they needed another school in Atherton, we passed an interim ordinance holding up all school building permits in our residential area—and everything is residential—pending a study.
>
> " * * * Our city has no control because most of these school districts are outside of Atherton, so, when it comes to voting, we have no control either, yet every school that is put up in Atherton costs us $4,500 a year. Of that $4,500, part of it is loss of taxes; the other part is police. Forty-five hundred dollars a year! We have 11 schools and we have no commercial or industrial areas.
>
> " * * * we had already five times the normal amount of school acreage. In our city, which comprises about 3,500 acres, we have almost 200 acres exclusively devoted to schools, and the normal city runs to about 35 or 40 acres. * * * We didn't bar any schools; we are not against education."

Mr. Bradley requested Mr. Black to clarify his statement that there were 7,000 students and only a population of about 7,000. Mr. Black stated that about 1,200 students were from Atherton and the balance of 6,500 from outside Atherton. Private schools, such as two Catholic schools, and the Menlo School and Junior College help to boost the student population.

Richard Perry, Deputy Attorney General, who was assigned to the case, testified that when the town of Atherton passed its ordinance the Director of Education requested the Attorney General to appear in the case, predicated upon the position that if a city or county can regulate placement of the public schools by zoning, they could exclude all schools and you would have nothing left except peripheral school systems outside the urban areas.

It was felt by witnesses representing various cities that the case resulted in a completely new concept in local zoning. Mr. Keller testified on this phase of the problem as follows:

> "* * * the district court of appeal held that cities have no power to control the location of schools within their boundaries and that the determination of where within a city school shall be located is solely one for the local school authorities.
>
> "* * * The effect of the immunity in this case is to completely destroy the power of the local legislative body and planning commission effectively to carry out the wishes of the community and establish a well-planned city."
>
> "* * * Unless our cities have the power to control all land uses, they cannot effectively control any. The result of the Atherton case is to give school districts and other 'local agencies of the State,' a license to frustrate city planning and zoning efforts and depress property values."
>
> "* * * Planning and zoning can be effective only if done by a single body within a given area, and to diffuse the authority and responsibility for it is to prevent its successful use."

School district and Department of Education representatives believed that the Taft case did not change the situation regarding school site location to any extent. Mr. Wallace Hall pointed out that there are provisions in the law which require co-operation between cities, counties, and school districts:

> "There is a section, of course, in the Education Code—it is Section 18403—which provides that the school district prior to the acquisition of a site must submit their proposal, or their proposed site or sites, to the city or county planning commission for a review and recommendation thereon before any final action can be taken by the school district; assuming they do not follow the recommendations of the city or county planning commission, a period of at least 30 days must elapse before action is taken. So, there is an opportunity in the law; in fact, it is provided that the school districts will work closely with the city and county planning commissions on this site selection and all the other related factors thereto."

The Superintendent of the Modesto Schools, James B. Corson, also testified on this subject. Mr. Corson felt that his school district co-operated to a great extent with their city, and could not conceive how these problems develop in some areas. An excerpt of his testimony is as follows:

> "We wouldn't think of constructing a building without checking all of these things that have been mentioned because, after all, if the streets are too narrow and the services aren't there, it is going to cost somebody some extra money.
>
> "We have never yet bought a site they haven't approved of; we've always worked all of these problems out in advance. They buy a recreation site right next to the school site and we plan that out together so we can perhaps get fifteen acres instead of ten. The city buys the one and we locate our school on the site in such

a way that they can use the same restroom facilities and not have to duplicate those. It has taken hours and hours, and weeks and weeks, and years of planning to bring those things about, and this decision hasn't changed that one bit."

Once again Mr. Keller felt that the immunity principle in regard to zoning could have serious effect on local zoning if applied to all "local agencies of the State." He testified that "the effect of the immunity in this case is to completely destroy the power of the local legislative body and planning commission effectively to carry out the wishes of the community and establish a well-planned city. Under the Atherton case, R-1 zone has lost its sanctity and alongside the finest residential dwelling units one can now expect to find schools and any other type of building or use which a local agency of the State may in its wisdom place there."

It would seem that probably the most important aspect of the entire concept resulting from the Taft and Atherton cases is whether or not districts other than school districts should be immune to local regulation and zoning.

CHAPTER IV

THE AGENCY PRINCIPLE

Representatives of cities felt that the *Taft* case decision established an entirely new concept concerning the regulatory powers of local government. Mr. Lewis Keller believed that one of the grounds of the Taft decision, "the new judicially declared concept that governmental agencies which can lay claim to being 'local agencies of the State' are immune from local regulations is by far the larger problem created by the decision."

It seemed that, in general, witnesses believed school construction should be in a category of its own since it is so closely regulated by the State. Mr. Keller emphasized that he felt the *Taft* decision included an undetermined number of types of special districts, creating what could be a serious problem to local government:

> "With respect to the large number of other local agencies which may now be immune from all local regulation, the effect of the decision is to leave a vast area of activities completely unregulated. Many of these activities will be of a kind directly affecting the public health, safety and welfare, and yet, as a result of immunity, there can be no local regulation to protect the public health and safety.
>
> "It is in this vast and uncharted region that there is an urgent need for State legislation. This state legislation can logically follow two courses. The State can assume the function of detailed supervision as it has done in the case of the school system and establish a new State department, or enlarge existing State departments, to effect and administer the needed regulation, or the Legislature may consent to local regulation of its local governmental agencies. Our organization stands firmly behind the principle of home rule and believes that the latter course is the only one which is consistent with California's principles of home rule and sound government."

Following the line of reasoning advanced by Mr. Keller, Mr. Charles R. Martin, City Attorney of Monterey Park, emphasized the practical ramifications of the court decision:

> "When the Supreme Court decided that the State has occupied the field, the second of the *Taft* decisions, that was not a shocking decision. It was not one that was particularly disappointing to the city attorneys; it opened no new door. We may disagree with it and say that we don't think the Legislature intended to occupy the field by the Field Act, but nevertheless the decision stands. It doesn't scare the city attorney in any particular way. The first decision did because the *Taft* case said school districts are agencies of the State in the local operation of state school systems and when it, the State, engaged in such sovereign activities, it is not subject to local regulations."

Mr. Martin believed that this "new law" had a great effect on local zoning in that evidently one public agency can no longer enforce its zoning against another public agency. He stated that as an example the County of Los Angeles has filed a number of suits against various cities in order to establish an airport, a junior college, and a county jail in areas which were contrary to local zoning ordinances. Several of these suits, he informed the committee, have been successful and others are pending.

In conclusion of his testimony, Mr. Martin expressed his recommendations as follows:

> "I agree with Mr. Biddick that perhaps a referee in disputed situations is the answer, whether that referee should be a court or some mediation board of the State, I do not know. Perhaps it is that all quasi-agencies should be eliminated. Local control should apply to all quasi-agencies, or quasi-corporations, but should not apply to direct state agencies. Perhaps it should be as one person suggested that the proprietary function should be eliminated from the immunity. Whatever the answer is, I think this committee owes an obligation to the people of the State of California to see to it, if home rule is to be preserved, that the police powers and regulations of one public agency may be applied to the other because certainly it is true that the police power of a municipality may affect and relate to one individual to protect society from the wrongful acts of that individual, certainly they may apply to 2 individuals, or 5 individuals, or 10 or 20 or 100, regardless of what corporate form they clothe themselves in."

The counties' viewpoint in regard to the *Taft* decision was given by Mr. William Siegal, representing the County Supervisors Association of California. Mr. Siegal noted that this particular problem "hasn't really come into the courts and to a head in all the years that it has existed in California up to now." In his opinion, the complexity of local government has required cities and counties to get along with one another and that usually their problems have been worked out without going to court.

The metropolitan counties, according to Mr. Siegal, have been having particular difficulty locating certain types of undesirable and unwanted facilities such as a jail, juvenile hall, or an industrial farm. No one particularly wants such a facility.

It was pointed out that in the case of Los Angeles County the facilities in question were deemed to be for the benefit of the entire county, and even though undesirable, are a part of absolutely necessary governmental functions and have to be located somewhere.

Mr. Siegal believed that no pat solution has been found as yet to this very complex problem, and suggested that it is up to the cities and counties and special districts involved to get together and try to come up with a solution.

APPENDIX A

State of California
Office of Legislative Counsel
Sacramento, California, September 24, 1958

Honorable Clark L. Bradley
802 First National Bank Building,
San Jose, California

Local Agencies—No. 4010

Dear Mr. Bradley:

Question

You have asked us the following question:

In the case of *Hall* v. *City of Taft*, 47 Cal. 2d 177, at 181, the court said that school districts are "agencies of the State for the local operation of the state school system." What other "local agencies of the State" exist?

Opinion

It is our opinion that, as a general proposition, counties and all of the various types of districts, agencies, and authorities, exercising governmental functions within limited territorial boundaries and created or authorized by state law are agencies of the State for the local operation of some particular function. For certain purposes cities may fall within such classification, although as a general proposition they do not. It is, of course, possible that for some particular purpose a particular type district, authority, or agency would not fall within the category in question.

Analysis

There are many types of entities which exercise governmental functions within limited territorial boundaries and which may therefore fall within the same category ascribed to school districts by the case of *City of Taft* v. *Hall*, 47 Cal. 2d 177. Consideration should be given to cities, counties, more than a hundred different types of districts,[1] and the several authorities and agencies. In the time allowed we have been unable to research the laws creating or authorizing the creation of all of these entities.

However, in the decisions referred to below, counties, cities (for particular purposes), irrigation districts, water districts, reclamation districts, and city housing authorities have been held to be state agencies, exercising state functions at the local level.

In the case of *Housing Authority of the City of Los Angeles* v. *City of Los Angeles*, 38 Cal. 2d 853, at 861 and 862, the court held a city has no power to abandon a housing project but must complete acts called for in a contract between the city and the city housing authority under the Housing Authorities Law and the Housing Cooperation

[1] See Analysis of California District Laws (1954) prepared by this office for the use of the Assembly Interim Committee on Municipal and County Government.

Law[2] and that a city housing authority is a state agency functioning under state law to fulfill state purposes. The court also stated that the City of Los Angeles acting under the Housing Authorities Law and the Housing Cooperation Law is an agency of the State, functioning under state law to fulfill state purposes and is not acting pursuant to its fundamental law to effect solely municipal objectives. The Housing Authorities Law provides that a housing authority is "a public body corporate and politic" (H. & S. C. Sec. 34240). This law also declares that slum clearance and the providing of safe and sanitary dwellings are "governmental functions of state concern" (H. & S. C. Sec. 34201).

In the case of *Griffin* v. *County of Colusa*, 44 Cal. App. 2d 915, 920, the county was held not responsible for an injury to a patient in a county hospital caused by the negligence of a nurse. In the decision the court distinguished between governmental and proprietary functions and ruled that counties are state agencies which exercise within their boundaries the sovereignty of the State, and, in the absence of a statute imposing liability, are no more liable than the State itself. The court also stated that cities are municipal corporations and not state agencies (see also *Dillwood* v. *Riecks*, 42 Cal. App. 602, 607 et seq.). In *County of San Mateo* v. *Coburn*, 130 Cal. 636, the court stated a county is a governmental agency or political subdivision of the State, organized for purposes of exercising some functions of State Government, whereas a municipal corporation is an incorpoation of the inhabitants of a specified region for purposes of local government.

In the case of *El Camino Irrigation District* v. *El Camino Land Corporation* (12 Cal. 2d 378, 383), it was held that irrigation and reclamation are agencies of the State whose functions are exclusively governmental. The court held that the land of such districts is exempt from execution, and that they own no property in the proprietary sense within the rule of the cases stating that property owned by a municipal corporation in its proprietary capacity and not devoted to or held for a public use, is not exempt from execution. (See also *Allen* v. *Hussey*, 101 Cal. App. 2d 457; *Laguna Beach County Water District* v. *Orange County*, 30 Cal. App. 2d 740; *Metropolitan Water District of Southern California* v. *Riverside County*, 21 Cal. 2d 640.)

In the case of *Laguna Beach County Water District* v. *County of Orange*, 30 Cal. App. 2d 740, the court held that a county water district is a state agency and its land located outside the boundaries is exempt from taxation and that a county water district is not a municipal corporation as that term is used in the laws of the State or in Section 1, Article XIII of the Constitution which provides that the property of the State or of any county, or municipal corporation is exempt from taxation except where such land is located outside the county or municipal corporation owning it. The court stated, on page 743 of the report, that there are in California a considerable number of governmental agencies exercising to a limited extent, powers of government, vested in them by the various laws from which they draw their right of existence and power of operation. The governmental powers most common to the majority of them are the right of eminent domain and the right of taxation. The court then stated that it is thoroughly settled that among such organizations, irrigation districts, drainage districts,

[2] H. & S. C. Secs. 34200 et seq.; and H. & S. C. Secs. 34500 et seq.

utility districts, and other similar organizations are not municipal corporations but public agencies exercising governmental functions and that, under the theory that their properties are, in effect, properties of the State, they are not subject to taxation. (See Sec. 85, 24 Cal. Jur., Taxation, p. 102 and cases cited therein.)

As we stated above, in the time allowed it is not possible to research the statutory or case law covering the hundred or more types of districts, agencies and authorities provided for in California law.

It is to be noted that the cases referred to above were directed to particular laws or factual situations and a determination of whether the district, authority, city, or county, was a state agency for the purposes of the particular law or factual situation.

However, we believe these cases are sufficient to establish that, as a general proposition, any district, agency, or authority created or authorized by state law and exercising governmental functions within limited territorial boundaries, and each county is an agency of the State for the local operation of some governmental function.

For instance, the law relating to community redevelopment agency of a city or county [3] is in all essential aspects identical to the law relating to housing authorities, referred to in the *City of Los Angeles* case, supra. These are both public corporations carrying out a state purpose. To our knowledge almost all districts have the power to tax and exercise eminent domain, referred to in the *Laguna Beach* case, supra.

However, there readily occurs to us several examples of entities which would require special consideration in the determination of whether they fall in the classification in question. Some entities such as the San Francisco World Trade Center Authority and the Los Angeles World Trade Authority which can perhaps be regarded as exercising powers within limited boundaries are specifically called state agencies by the state law creating them (Stats. 1947, Ch. 1508, Secs. 3.2 and 3.3). The law provides that the territory under each authority is limited to an area not exceeding 30 acres in San Francisco and Los Angeles, respectively. The San Francisco Port Authority is somewhat similar (H. & N. C. Secs. 1690 et seq.). In a sense it operates within a limited territory, the territory including the port in San Francisco and the State Belt Railway. The state law specifically places the authority in the State Government (H. & N. C. Sec. 1700). Another example is the Los Angeles Metropolitan Transit Authority (Stats. 1957, Ch. 547). The authority is carrying out a state function (Sec. 1.1) and is denominated "a public corporation of the State of California" but, expressly, "not a 'state agency' as defined in Government Code Section 11000" (Sec. 3.2). It has the power of eminent domain (Sec. 4.6) but not the power to tax (Sec. 4.19).

Very truly yours,

(Signed) Ralph N. Kleps
Legislative Counsel
By Barbara Cochrane Calais
Deputy Legislative Counsel

[3] H. & S. C. Secs. 33000 et seq., 33040 et seq., and 33200.

APPENDIX B

PRINCIPAL WITNESS RECOMMENDATIONS

1. Status quo on all aspects of the Taft decision.
2. Provide that only school districts remain under the immunity provisions of the Taft decision.
3. Provide local agencies with the power to enforce reasonable supplemental regulations over school construction.
4. Provide that the State may delegate their inspection function of school construction to local jurisdictions having adequate inspection facilities available; adequacy to be determined by the State Division of Architecture.
5. Continue to centralize all school construction regulations at the state level.
6. Provide that the State has complete jurisdiction only for school construction as covered by the Field Act.
7. Authorize school districts to require contractors to obtain permits from local jurisdiction for all school construction.
8. Provide that disputed zoning decisions be referred to the State Local Planning Advisory Committee for action.

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CONCEPTS IN METROPOLITAN GOVERNMENT

FINAL REPORT OF THE ASSEMBLY INTERIM COMMITTEE ON MUNICIPAL AND COUNTY GOVERNMENT

House Resolution No. 277, 1957

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2—L-4102

LETTER OF TRANSMITTAL

HONORABLE RALPH M. BROWN
Speaker of the Assembly
State Capitol, Sacramento, California

DEAR MR. SPEAKER: The Assembly Interim Committee on Municipal and County Government submits herewith the third in a series of final reports representing a field of study by the committee between the 1957 and 1959 Regular Sessions of the Legislature, according to House Resolution No. 277 of the 1957 Regular Legislative Session.

This final report pertains to the committee's study on the subject of metropolitan government.

Contained in the report are findings regarding recent proposals and plans for metropolitan government, present methods of solving the State's metropolitan problems, and suggested criteria for a metropolitan government authorization in California.

Respectfully submitted,

CLARK L. BRADLEY, *Chairman*
WILLIAM BIDDICK, JR., *Vice Chairman*

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CHAPTER I

INTRODUCTION

Metropolitan and urban area problems are now well known to government officials and are becoming increasingly apparent to the average citizen. A metropolitan area generally consists of a fragmented governmental structure, usually encompassing a number of smaller cities and unincorporated areas of considerable population surrounding a central city of much greater size. There are certain characteristics of a metropolitan complex which tend to make each of these separate units of government interrelated; for example, people who live in one part of the area often work in another. Many times they do their shopping in neighboring jurisdictions. Population movement flows unimpeded across local boundary lines. Large numbers of the population find it difficult to know what jurisdiction provides them with their governmental services. Almost anything that happens in one area has significance in each of the other areas. In other words, there is a community of interest throughout the metropolitan area.

The major problem is how to knit these separate units of local government together so that the entire community can act effectively as a large organization in an effort to solve their individual problems. There is little doubt that many of the major municipal-type services could be operated more efficiently and perhaps more economically on an overall basis. Many of these services, especially those related to health and safety, are of such a nature that boundary lines often have to be ignored, and therefore a stop-gap program of mutual assistance and co-operation has been initiated in many areas.

There is little doubt that a metropolitanwide policy making body should be created within each metropolitan area. The close relationship and dependency of one governmental unit on another would seem to make areawide policy determination essential. The composition of this governing body should receive perhaps more consideration than any other one aspect since experience has shown that the most effective government is one which provides the people with the best representation. Most of the major plans for metropolitan government leave the individual municipalities intact; therefore it would seem that a system for providing the elected representatives of local government with a proper voice in the policy determination is essential.

Also of utmost importance is the grant of power given to the metropolitan government. At least one new metropolitan organization has been given very broad powers with which they can establish and maintain minimum standards throughout the entire area with regard to all local affairs regardless of what agency may be performing such service. Other powers might be: (1) the right to form, consolidate, or abolish special districts; or (2) the right to abolish, limit the number, or realign the boundaries of municipalities; also (3) the power to take over additional services could be granted the metropolitan government

as the need arose. These few examples point out the importance of much detailed study on this subject before a sound reorganization plan can be adopted.

Generally speaking, there is considerable conflict between advocates of metropolitan government and local government officials as to which services should be administered areawide and which should be retained by the local government. Local government officials naturally desire to retain as many services as they can due to such reasons as local pride, vested rights, or the well guarded home rule concept. However, it would seem that the very desirable home rule features of local government could be retained to a great degree by incorporating certain built-in features into the metropolitan organization structure. Some local autonomy would be sacrificed, no doubt, but the benefits to be derived from metropolitan operation of a number of the major municipal type services would definitely be compensating factor.

The Municipal and County Government Committee has kept in close contact with those areas within California interested in metropolitan government. The proposal by the Sacramento Metropolitan Area Advisory Committee was heard by the committee at a hearing in Sacramento on December 6, 1957. In addition, several hearings were held in Los Angeles on the subject of functional consolidation, and progress reports were given by government officials representing their newly established Los Angeles Metropolitan Government Study Commission.

Also, members of the committee and staff attended a number of metropolitan government symposiums, the American Municipal Association Conference, the Western Governmental Research Association conferences, and the annual meetings of the League of California Cities and the County Supervisors' Association of California. Metropolitan government was a major topic at each of these conferences.

Therefore, this report will present some of the viewpoints and information gained through the activities of the committee during the 1957-58 interim.

CHAPTER II

RECENT DEVELOPMENTS IN METROPOLITAN GOVERNMENT

In recent years a great number of studies have been conducted in metropolitan areas culminating in many proposals for governmental reorganization although only a handful of these have been put into actual operation. The list of areas in the United States studying the feasibility of metropolitan government is quite impressive. Reports on metropolitan government have recently been published by local committees in the following areas: St. Louis, Missouri; Milwaukee and Madison, Wisconsin; Sacramento and Fresno, California; Grand Rapids and Flint, Michigan; Seattle, Washington; Nashville, Tennessee; and many many others. In fact, the list reads almost like the list of metropolitan areas itself.

Perhaps the two most comprehensive and successful metropolitan government reorganizations that have taken place recently are the Federated Metropolitan Government in Toronto, Canada, and the Metropolitan Dade County (Miami) Government in Florida. Therefore, a brief summary of these two plans, as well as the Baton Rouge Reorganization, the proposal for a metropolitan government in Sacramento, and the Metro Corporation in the State of Washington, will be presented in this chapter.

METROPOLITAN TORONTO

The outstanding example of metropolitan federation, a concept in which local governmental units retain their identity and many of their functions but delegate certain areawide services to a central government, is the metropolitan government of Toronto, Canada.

Metropolitan Toronto, organized in 1954, is composed of the City of Toronto and 12 suburban municipalities. There is no unincorporated territory included nor is the Toronto area involved with county government. It is strictly a federation of municipalities.

The governing body of the metropolitan government has 24 members, 12 of which are from the City of Toronto. Representing the City of Toronto are the mayor, two of the four controllers who received the highest vote at the last election, and nine aldermen from the nine city wards who received the highest number of votes in their respective wards at the last election. The suburban municipalities are represented on the governing body by their respective mayors. If the chairman is an outsider, he is given a vote in case of a tie. If he is a member of the 24-man governing board, he may vote a second time in case of a tie.

Each of the 13 municipalities has retained its identity and continues to be responsible for local functions of government, including local planning, local streets, building regulation, and most public health services. The services for which the metropolitan council originally became responsible were water supply, sewage disposal, housing rede-

velopment, educational accommodations, arterial highways, metropolitan parks, certain welfare services, public transportation, certain administration of justice expenses, and the overall planning of the area. Subsequent to its inception, the metropolitan government has assumed the additional services of police, licenses, civil defense, air pollution control, and the operation and maintenance of an isolation hospital. A study is currently under way to consider the advisability of unifying the municipal fire departments and placing their operation under the metropolitan government.

In 1957 the Ontario Legislature established a commission to inquire into the government of metropolitan Toronto and report back to the Legislature. The commission, consisting of five members, with the Chairman of the Ontario Municipal Board presiding, held public meetings over a period of weeks at which briefs were submitted by all areas, municipalities, school boards, and other interested public bodies. The commission report gave the new metropolitan government high endorsement. The report stated that the commission had been greatly impressed by the evidence of continued and widespread acceptance and support of the principle of federation of the autonomous local governments in the Toronto area, which was the foundation of the plan. To quote from the report:

> "It is quite evident that notwithstanding previous differences and doubts, the experience of the past four years has shown beyond question that the application of the principle of federation was a sound and practical approach to an acceptable and workable solution of the complex problem of providing adequate municipal services in the Toronto metropolitan area * * *
> "Great progress has been made in removing the serious obstacles to the economic growth and development of the area which seemed insurmountable under the former outdated system of rigidly divided jurisdictional areas and equally rigid and unbalanced distribution of taxable resources."

Some are of the opinion that the Toronto plan does not adequately spread the burden of certain costs over the entire metropolitan area. This is due to the method of financing where tax levies are made against the individual communities involved and apportioned according to the equalized value of the taxable property in each governmental unit. Thus, the health and welfare costs in the central city may be higher because it generally contains the majority of the lower economic groups in the area.

There seems to be little doubt that the Toronto plan is a success. However, it would seem that several questions would have to be answered before the Toronto federated plan could be used in California. These are:

(1) The Toronto plan excludes county government and unincorporated area, so, therefore, how would they be provided for?
(2) Would the plan be acceptable to cities on a mandatory basis as in Toronto, and if not, how would the plan work if on a voluntary basis and some cities did not desire to participate?

(3) Would a single representative on the metropolitan council be satisfactory to the suburban cities even though their populations varied, as in the case of Toronto, from around 8,000 to 148,000?
(4) How would the council provide representation and yet not get too unwieldy in an area such as Los Angeles County which has over 60 cities?

The biggest drawback to a federated type government in California would seem to be that it would create a new layer of government in addition to the existing county, city, and special district. It would seem that metropolitan government could be better achieved in this State by reorganization of the larger unit of local government, the county, into an organization that could provide areawide services and at the same time provide the member cities with adequate and fair representation in a manner similar to the federated plan.

METROPOLITAN DADE COUNTY

The Dade County plan was initiated in 1956 when the electorate of Florida approved a constitutional amendment which would enable Dade County to establish a metropolitan government. The constitutional amendment gave them remarkably broad responsibility and authority. As an example, Dade County was granted the power to change the boundary of, consolidate, and abolish all municipal corporations, county or district governments, special taxing districts, authorities, boards, or other governmental units. They were also given the power to establish new municipalities and other units of local government and prescribe their jurisdiction and powers.

A board of freeholders spent almost a year drafting a charter which was ratified by the electors of Dade County in May of 1957. The charter, while not adopting many of the broad powers authorized by the Constitution, is nevertheless quite unique. The county government is required to establish and maintain minimum standards of services throughout the entire area under its jurisdiction with regard to all local affairs regardless of what agency may be performing or providing the facility or service. If a governmental unit fails to comply with such standards and does not correct such failure after reasonable notice by the board, then the board may take over and perform, regulate, or grant franchises to operate any such service. The charter and constitutional amendment gave the metropolitan Miami government sufficient powers to completely reorganize the county government and districts.

Briefly, the governmental structure under the Dade County plan consists of a county commission which has five members elected from districts by a countywide vote, and five additional members elected from districts by the people of the district, plus one member from and by each municipality having a population in excess of 60,000. Due to the population requirement, only one city, the City of Miami, is represented on the board.

There is a chief executive directly responsible to the board to handle all administrative matters, and a county attorney appointed by the board. All independent county offices, other than the school board and the school superintendent and court officers have been abolished. This type

of reorganization was necessary due to the large number of independent offices in Dade County government.

Recently there was a charter amendment proposed and actively supported by the Dade County League of Municipalities which would have prohibited the Dade County government from taking any action infringing upon the municipal "right to exercise all powers whether granted by their several charters or by special act or by general law." In effect, adoption of the amendment would have limited the metropolitan government's powers to unincorporated areas, seriously impairing its effectiveness in providing metropolitan government. The election on the referendum was held on September 30, 1958, and the voters confirmed their desire to give the Dade County Home Rule Charter a fair trial by defeating the proposed municipal autonomy amendment by a vote of 73,958 to 49,469.

Four days before the referendum County Manager O. W. Campbell, former City Manager of San Diego and of San Jose, released his first annual report on the progress of metropolitan Dade County. He called attention to the fact that the infant government had weathered over 150 suits during its first year of operation, and in the cases already decided, the Florida Supreme Court upheld the metropolitan government in unequivocal terms.

The annual report cited numerous achievements under the metropolitan government including a reduction in the number of county departments from 35 to 17, a 6½ percent reduction in the county tax rate, an extension of the civil service program and pay increases for nearly half of the county's employees, and numerous successful departmental reorganizations which have promoted greater efficiency.

As in the case of metropolitan Toronto, the metropolitan Dade County government is also quite successful and has been able to provide areawide services on an efficient and more economical basis. However, Dade County has had numerous difficulties and conflict with the 26 cities located within the county. It would seem that much of this conflict could have been avoided by providing for a more equitable method of municipal representation on the metropolitan governing body. Although fear and prejudices are difficult to overcome in such extensive reorganizations, it would seem that they could be allayed much quicker if, as in the case of Toronto, the cities had a voice in policy determination.

BATON ROUGE METROPOLITAN REORGANIZATION

In January, 1949, a city-parish system, encompassing only the City of Baton Rouge and the East Baton Rouge Parish in the State of Louisiana, went into effect. Prior to the consolidation the city consisted of about 35,000 population in an area of 4½ square miles. The reorganization added to this about 65,000 population and approximately 500 square miles of territory.

In the parish three separate areas were established: an urban area, an industrial area, and a rural area. Each area has a different tax structure; a uniform tax is levied in the parish for the areawide services, a separate tax is levied within the city or urban area to support municipal services, and the industrial area provides its own services at its own expense.

Apparently out of respect of state law, both the city and the parish were retained, as well as their councils. However, they provided for interlocking membership. The parish governing body consists of the seven councilmen from the City of Baton Rouge, together with two members elected from the area of the parish outside the city.

A mayor presides over both councils, appoints most department heads, and supervises and directs services in most departments much like a city-county manager. Many officials serve in a dual capacity for both the city and the parish.

The services performed by the parish areawide are highways, bridges, sidewalks, airports, public building maintenance, planning and city streets. The city provides such services as sewer maintenance, police protection, fire protection, traffic regulations, garbage collection, building inspection, and street lights.

The Baton Rouge plan would seem to present a great many difficulties if it were to be adopted for California use since most of the State's metropolitan areas contain a number of municipalities, and the structure established for the governing board would not be workable. However, the principle for retaining the separate jurisdictions and establishing some method of representation by municipalities on the county governing board might be feasible for some areas. One of the most important features of the plan, it would seem, is the tax differential provisions that were established between the urban areas desiring a full array of municipal services and the rural or semirural areas desiring only the traditional county services. This particularly feature, which has been proposed in the Sacramento plan, has a great deal of merit. In this way an entire county could be served by a central metropolitan government but the rural areas would not have to support the municipal services unless they desire to receive such services.

PROPOSAL FOR METROPOLITAN GOVERNMENT IN SACRAMENTO

In the State of California the major proposal for metropolitan government is the plan in Sacramento County which was studied by the Assembly Interim Committee on Muncipal and County Government. So far the plan has not been approved by the participating governments and therefore is merely a proposal. However, a great deal of study went into the Sacramento problem.

On January 12, 1956, the Sacramento Metropolitan Area Advisory Committee was appointed by the County of Sacramento and the Cities of Sacramento and North Sacramento. The committee was formed to carry out the following functions: "To study and make recommendations to interested public agencies regarding the broad problems of metropolitan area organization and growth with attention to incorporation, the formation and/or the consolidation of special districts, annexation, or any other possible solution to the problems of governmental organization. The committee shall act in an advisory capacity to the city councils and to the county board of supervisors."

The advisory committee was composed of 21 members of which nine were appointed by the county board of supervisors, nine by the City of Sacramento, and three by the City of North Sacramento. The other three incorporated cities in Sacramento County—Galt, Folsom, and

Isleton—were not represented on the advisory committee, nor did they directly share in the cost of the study. In 1956 the Public Administration Service of Chicago was hired by the committee to conduct a comprehensive study at a cost of $67,000.

In essence, the Public Administration Service Report provided for a governmental reorganization calling for the consolidation of Sacramento, North Sacramento, Isleton, and Galt, with the County of Sacramento. The report recommended that the new governmental boundaries should coincide with that of the present county, and the area should then be divided into five boroughs. The metropolitan government would be governed by an eleven member metropolitan council with one member elected from each of the five boroughs and six at large. Each borough, then, would have an elected advisory council of five members. The borough council members would be appointed to the major boards and commissions, and one important aspect is that borough council resolutions would be required to be immediately placed on the agenda of the metropolitan council.

The borough metropolitan council relationships were brought out in the questioning of Mr. Alvin Landis, member of the advisory committee, at the hearing in Sacramento on December 5, 1957, by Chairman Clark L. Bradley:

Bradley: Since the borough does not have legislative power, and is primarily advisory in nature, how does it provide for decentralization?

Landis: By the delegation of the functions of the metropolitan council to the borough for those functions which are local in nature —boroughwide—and by having the borough administrative office available to the people for those services which the people of that borough require.

Bradley: Mr. Landis, isn't it still all the metropolitan central governmental unit? The delegation that you refer to would merely be the branch offices of the department of public works, the department of health, police department, fire department, or something like that.

Landis: Or it may be a park exclusively under the jurisdiction of that borough because it is a local park. That's correct.

Bradley: And the persons put in charge of that branch in the borough would be directly related to the central metropolitan government.

Landis: Directly or indirectly, depending upon how the system of employment and the responsibilities were delegated.

Bradley: Now I'm back to my original premise; what is the contemplated representation that would be created in the borough?

Landis: The plan proposes that there be one member of the Metropolitan Council elected from each borough. That would put five members from the five boroughs on the Metropolitan Council. In addition, there would be six members of the Metropolitan Council elected at large, which would give you the eleven members of the Metropolitan Council. Here is a mandatory tie-in recommended here, as Dr. Cowan previously explained, and that is that any problems which the borough council might have, and desires the

Metropolitan Council to consider, can be placed on the agenda of the Metropolitan Council for its consideration at an early meeting. The Metropolitan Council must consider the problems of the boroughs as the boroughs themselves raise these problems.

Another interesting factor is the proposal that there should be tax differentials between urban and rural areas on a pay-for-what-you-get basis. Dr. James R. Cowan, Chairman of the Advisory Committee, testified that these tax differentials would be necessary in order to protect the rural areas from having to pay for services they are not now getting. He anticipated that the rural areas of the county would retain about the same level tax rate that they are already paying to the county.

The present urban unincorporated areas' cost for municipal type services under this plan would be taken care of in the tax differential, as brought out in the following excerpt:

Bradley: Then do I assume that the metropolitan form of government would contemplate proceeding through special assessment districts to meet the particular needs of an area for special services?

Landis: Whether it is a special assessment district or some other kind of procedure for the imposition of a tax differential to let the people pay for what they are getting—but some kind of procedure along that line would be required, yes. I might point out again, Mr. Bradley, that there are 157 special districts furnishing all kinds of services, that is, sewers, streets, sidewalks, and the rest of them so that, in essence, districts are furnishing a municipal type service. The City of Sacramento, and other cities, furnish that by a single council and through the authority of a single council. Here, because there is no one government which can give them these kinds of services, they are compelled to resort to the special service district form of government.

The report recommended that the new government be given wide discretionary powers to dissolve, eliminate, or modify special purpose districts with the exception of school districts. In the case of school districts, it was recommended that their reorganization be left to the state procedure of reorganization by the county district organization committees.

Assemblyman Ernest R. Geddes questioned Dr. Cowan on the advisability of leaving school districts out of the study in Sacramento. Dr. Cowan answered the question as follows:

"* * * the school districts were left out probably for the basic reason that the Legislature does provide and make mandatory a study of school reorganization in the State. There is in every county, or in almost every county, a school district reorganization committee made mandatory by legislation, and that committee is operating effectively in Sacramento County. It is working toward the consolidation and unification of districts within this county.

"Our report did study the school districts. We have over 17 pages in the Appendix alone of the P. A. S. Report concerning the statistics of the school districts. Sacramento County has reduced

its school districts from over 90 to where it has approximately 42 school districts operating at the present time. There have been, and will continue to be, proposals for unification. It would have been a duplication of effort on the part of our committee to go into this phase thoroughly since it is already being done in this county. Our committee did go along with basic state recommendations and that is that districts should be unified."

The Sacramento Metropolitan Area Advisory Committee recommended that a number of constitutional amendments would be necessary in order to effectively put their plan into action. For one thing, the Constitution presently requires a two-thirds countywide vote to annul a county charter. A two-thirds vote could prove difficult to get and could leave the county with the adoption of a metropolitan government (which only requires a majority vote) but with the old charter causing a legal problem. Also, the Constitution requires a majority vote in each municipality in order to effect a consolidation. Therefore, five separate elections would probably be required and the consent of each city would be necessary before the metropolitan government could be established; any incorporated city voting against the proposal would become an island within the new city-county, presenting a difficult problem to cope with.

Assemblyman Roy Nielsen questioned Mr. Landis as to the intent of the proposed constitutional amendment as follows:

Nielsen: Mr. Bradley, there is one question I would like to ask, and that is in relation to the proposed constitutional amendment. Naturally the constitutional amendment must be considered by perhaps this committee of the Legislature. Is it my understanding that this constitutional amendment which is proposed will be an all-inclusive constitutional amendment and carry with it the proposals that a two-thirds vote be eliminated for the annulment of the city or county charter, and that the majority vote of each municipality is eliminated in a countywide election?

Landis: That is correct.

Nielsen: Now you propose to do that by a majority vote?

Landis: The proposal in the report is to the effect that the city-county consolidation should become effective on a majority vote. I would like to address myself further to the question but * * *

Nielsen: Then you would authorize a majority vote on a countywide basis which would eliminate the independent municipal elections as far as their consideration, or their approval of a merger, is concerned.

Landis: That is also recommended in the report.

Nielsen: In other words, if the City of Sacramento by its vote voted against the merger, but if the countywide vote favored the merger, then the City of Sacramento's charter would be annulled and they would become a part of the plan.

Landis: Assuming, of course, that by getting a favorable vote in the rest of the county the total vote would be a majority vote in favor of the plan.

Further questioning by Assemblyman Gordon H. Winton brought out another side to the need for a constitutional amendment to eliminate the two-thirds vote requirement:

> **Winton**: Mr. Landis, in looking over the proposals on page 8, I am wondering, first, as to the present charter of Sacramento County. What does it require in the way of amending the charter —what kind of a vote?
>
> **Landis**: I think it is a majority vote.
>
> **Winton**: Well, now, this is a question. Could most of this be incorporated into the present Sacramento charter by amendment of the charter, instead of annulment of the charter?
>
> **Landis**: That question was raised at the County Board of Supervisors' hearing too. As a matter of fact, they supplemented the question, or rather supported it, by saying that if we did that, the incentive for incorporation might be eliminated. Basically—and I'm not too sure of this—I think that in order to give the county the authority to perform all of the municipal type services, it would require a constitutional amendment—eliminating the two-thirds vote.
>
> **Landis**: I don't know how you could, however, but it may be.

It would seem that this particular phase of the plan would require additional study so that the best method could be applied to the formation procedure.

Another drawback in regard to the present constitutional provisions for city-county merger is that the city initiating the proceedings must be over 50,000 population. The initiating city is also given the power to elect freeholders to write the new charter, etc. Thus, the county and the four municipalities remaining could legally take no part in the merger proceedings until it came up for vote; only the City of Sacramento would have this authorization, according to the Constitution. Therefore, the advisory committee recommended that they be given authority to participate in drafting a constitutional amendment, or amendments, which would alleviate these conditions.

Shortly after the committee's report was submitted to the participating governmental jurisdictions, the length of time that the committee had been appointed ran out and the committee was not reappointed. In its place a new committee was formed which gave representation to the other three cities in the county on the basis of five representatives from the City of Sacramento, five from the County of Sacramento, three from the City of North Sacramento, and two each from the cities of Folsom, Isleton, and Galt. It was felt that in this way a greater acceptance could be had from the several incorporated cities which were most disturbed over the PAS Report recommendations.

The new committee, which is called the Metropolitan Government Committee of Sacramento, is currently studying all of the various governmental alternatives available to establish a metropolitan government, as well as the PAS Report recommendations, hoping to come up with a solution that will be acceptable to the incorporated cities as well as the unincorporated urban fringe. In August of 1958 the Metropolitan Government Committee authorized an analysis of a 167 square mile area, which is north of the City of Sacramento and has

an approximate population of 190,000, as a portion of their overall study. This was instigated by a movement to form a new city in this area which would contain 136 square miles and have 35,000 more people than the City of Sacramento. The Citizens Committee for Incorporation circulated petitions for an election on their proposal, but recently announced that they could not at this time get the required number of signatures to qualify the area for an election on cityhood.

In addition to the proposal for a new city, other petitions have been circulated for a possible annexation of an area which is a portion of this 136 square miles, and which would surround the City of North Sacramento. The annexation would, of course, be to the City of Sacramento. This stepped-up activity in the north area of Sacramento County caused the Metropolitan Government Committee to focus its attention on an analysis of the government reorganization possibilities in this particular area as to whether the area should be incorporated, annexed to the City of Sacramento, either at one time or in stages, utilize contracts for services with county government, or go ahead with the recommendations of the Sacramento Metropolitan Area Advisory Committee. A report of the findings is expected in January of 1959.

Another more recent development has been a recommendation to redefine the metropolitan area to encompass less than the entire county since 93 percent of the county's population lives in approximately 23 percent of its area. Proponents felt that redefinition would provide a more realistic basis for metropolitan municipal reorganization and would avoid many procedural obstacles which presently exist to a full city-county merger.

METROPOLITAN MUNICIPAL CORPORATIONS IN THE STATE OF WASHINGTON

The State of Washington recently passed enabling legislation approved by the Governor on March 22, 1957, creating a new form of metropolitan government, the metropolitan municipal corporation. A metropolitan municipal corporation may be created through the process of an election called, in one method, by resolution of the governing body of the central city, two or more component cities, or the county, and in the other method by a petition signed by at least 4 percent of the qualified voters. Adoption requires a majority favorable vote within the central city and within the remaining territory of the metropolitan area outside the central city.

A metropolitan municipal corporation is authorized to perform one or more of the following functions: (1) metropolitan sewage disposal; (2) metropolitan water supply; (3) metropolitan public transportation; (4) metropolitan garbage disposal; (5) metropolitan parks and parkways; and (6) metropolitan comprehensive planning. The resolution or petition must state the services to be performed by the particular municipal corporation. Additional functions thereafter either require the same procedure of an election, etc., as was required for the establishment of the metropolitan municipal corporation, or if a resolution providing for the performance of additional functions is adopted by the metropolitan council, and within 90 days concurring

resolutions are adopted by each component county, each component city of the first class, and at least two-thirds of the other component cities, an election is not necessary.

The governing body is composed of a number of mayors and councilmen representing the participating cities based on the city's population and other requirements, together with one member from the governing body of each component county.

The first metropolitan corporation was established in South Snohomish County on January 13, 1958, to provide only one of the six authorized functions, comprehensive planning.

An attempt was made to establish a metropolitan corporation in King County but the plan was defeated at an election on March 11, 1958. It is interesting to note that although a favorable vote was obtained in Seattle, the other portion of King County voted unfavorably. This particular metropolitan corporation was to have provided the functions of sewage disposal, mass transit, and metropolitan planning. A second and successful effort was then made in King County on September 9, 1958, although the functions were reduced from three to one—that of sewage disposal.

It will be interesting to follow the progress of these two limited metropolitan governments to see if eventually they will be successful in taking over the operation of additional functions and thus establish metropolitan government in a real sense.

CHAPTER III

PRESENT SOLUTION TO THE PROBLEM OF METROPOLITAN GOVERNMENT IN CALIFORNIA

In California there is only one method authorized in the State Constitution to provide for comprehensive reorganization on a metropolitan basis and that is city-county consolidation which was enacted into law in 1856 for the San Francisco area. Since that time several metropolitan areas in the State have on occasion studied and discussed the use of this device as a solution to their problems, but none of these areas have been successful in accomplishing this type of governmental reorganization.

METHODS AVAILABLE TO SOLVE METROPOLITAN PROBLEMS

In lieu of reorganization of governments to provide services on a metropolitan basis, the State's metropolitan areas have used various other devices in an effort to cope with their problems. The most commonly used have been: (1) annexation of unincorporated territory to a central city or other large city in the area; (2) incorporation of large unincorporated territories within the metropolitan area as separate cities; (3) functional consolidation of one or more functions which can be performed on a uniform basis areawide, usually performed on a co-operative basis by the county; and (4) metropolitan special districts.

Annexation

In most metropolitan areas of California, many incorporated cities are involved other than the principal city. Therefore, annexation of unincorporated territory is generally of little use in solving the problem of uniformity of service to the area as a whole. In areas where the central city has undertaken an ambitious annexation program, usually not too much has been accomplished. In fact, additional complications have often resulted; the smaller cities have usually ended up fighting each other and the central city for lucrative territory which has caused a great deal of haphazard annexations, and in addition has caused many unincorporated areas to incorporate themselves in self defense. It would seem that annexation as a solution to metropolitan problems would only be effective in areas which contain a single city surrounded by urban unincorporated territory. It would, therefore, have to be considered as an ineffective device with which to cope with metropolitan problems in California.

Incorporation

Some have advocated the incorporation of all unincorporated territory in metropolitan areas as a method of solving metropolitan problems. In many areas incorporation could ease the situation when there are numerous small, overlapping and costly special districts providing the municipal type services and no other method is available to cope with them. Incorporation could therefore be considered a good method

of coping with the special district problem and also in some areas might be the only possible method of obtaining certain municipal services. However, in a metropolitan complex containing numerous cities, merely incorporating the unincorporated area without centralizing major municipal type services on a metropolitan basis should not be considered as the answer to providing the best possible government to a metropolitan area. In fact, in such areas as Los Angeles County the numorous cities have greatly complicated the picture and have created additional stumbling blocks for effective governmental reorganization. However, cities provide an excellent method of self-determination in local affairs and it may be said that cities definitely fit into the picture of metropolitan government.

Functional Consolidation

Functional consolidation has been a most successful method of alleviating metropolitan problems without complete governmental reorganization. The county contract services system and the "Lakewood Plan," where all municipal services are available through county government, have been used quite extensively in Los Angeles County. Through this process centralized services on a metropolitan basis have become increasingly popular. However, this method could be considered as only a piecemeal solution to the problem of metropolitan government.

The county contract city program, often called the Lakewood Plan, seems to be quite satisfactory to Los Angeles County's 17 new cities which have elected to receive their municipal type services in this manner. Through this procedure they have been able to take advantage of large-scale operation, experience, and the know-how of established county departments so that they have been able to get good services at reasonable cost. Thus far the older cities of this county have not taken complete advantage of the contract city plan.

On a less extensive basis, the older cities have solved some of their problems by functional consolidation of a number of the services which incidentally were the principal issues in Dade County, Toronto, Baton Rouge, and Seattle where most of the action in regard to metropolitan reorganization has taken place. For example, tax collection and assessment and health protection are now operated to a great extent by Los Angeles County. The older cities are now taking advantage of five or more services performed by the county. Some of these are provided by county districts such as libraries, air pollution control, parks and recreation, and sewage disposal, but the majority are provided by county departments on a contract basis.

During the Fiscal Year 1957-58 there were over 794 services performed by the county for the various cities located within the county. Cities received an average of 12 types of services each. Of the 41 services specified, the number requested by the individual municipalities ranged from five in the City of Santa Monica to 30 in the "contract" city of Norwalk. So, although no new governmental structure has been developed in Los Angeles County to provide areawide government, nevertheless it is being partially provided through new methods practiced by their county government.

This system has also spread to other metropolitan counties such as Santa Clara with similar success. Santa Clara now provides six services

to cities through the contract system. These services are: sheriff's patrol service, rental of jail facilities, communications services, engineering subdivision surveys and checking, building inspection services and planning services.

Metropolitan Districts

The metropolitan district device has also been used quite extensively in California. A number of districts, although not perhaps originally designed for metropolitan operation, are now providing service to incorporated, as well as unincorporated, areas on an extensive basis.

A common criticism of the metropolitan special district is that they often deal separately with only a portion of the overall metropolitan problem. Also, they tend to vary a great deal between one another in their organization structure, and since each is a separate entity, they could become cumbersome, confusing, and unco-ordinated if used extensively as a substitute for metropolitan government.

This is not meant to be an indictment of the metropolitan district per se, however, since many of them seem to be an excellent forerunner to a centralized metropolitan government. In fact, a number of these districts cross county lines, such as the Metropolitan Water District in Southern California, and the Bay Area Air Pollution Control District in the San Francisco area, and would possibly have to be retained even though a metropolitan government were established due to the nature of the service they provide.

The experience of some of these districts with respect to the composition of a governing body should bear considerable attention by those studying forms of metropolitan government. The Bay Area Air Pollution Control District, which was established in 1955 to serve six counties, is a good example of a new approach to the problem of representation. The governing body of this district is composed of 12 directors, two of which are appointed from each county. One of the two directors is selected from and by the board of supervisors of the county, and the other is a mayor or councilman appointed by a selection committee composed of all the mayors of the cities within the county. Hence, all of the members of the board of directors are local officials selected by local governing bodies. It is felt that in this way local responsibility is obtained, and if other districts are formed in the area with similar provisions, a single board of directors could perhaps eventually be appointed and the various districts combined into a single administration, thereby permitting an easy transfer to metropolitan government operation at a later date.

A number of successful areawide district operations can be found in Los Angeles County. Some of these are: (1) the county sanitation districts which serve a large segment of the cities, as well as the county; (2) the Metropolitan Water District which also is governed by representatives of local agencies; (3) the Consolidated Fire Protection District which is governed by the board of supervisors but serves 17 cities; and (4) the Flood Control District which serves the entire area and is governed by the board of supervisors.

It can be readily seen that metropolitan special districts have been used extensively, and the above list is only a fraction of the complete listing. The principal drawback to the metropolitan district is that,

once again, a new level of government is established and many question the need for this. In addition, some of the districts such as the fire protection district are in an unstable position due to municipal annexations of unincorporated areas and possible withdrawal by municipalities.

CURRENT METROPOLITAN GOVERNMENT STUDIES IN CALIFORNIA

In addition to the metropolitan government study being conducted in the Sacramento area, which was previously discussed, another major study is being undertaken in the Los Angeles County area.

The Los Angeles Study

The first realistic approach to an overall study was finally undertaken in Los Angeles County in 1958 when the outgoing chief administrative officer of Los Angeles County recommended that a committee be formed taking in all of the incorporated cities in the County of Los Angeles, as well as the county government, to study problems of metropolitan government. It was eventually decided that the Metropolitan Government Study Commission should be composed of 165 members and appointed as follows: one representative from each city other than the City of Los Angeles, and this would be the mayor unless otherwise designated; five representatives from the City of Los Angeles; and five representatives from the County of Los Angeles, making a total of 70 members. Each of the 70 representatives from the cities and the county would then select one citizen representative, which would bring the combined commission to 140 members. Then the 140 members would select 25 additional citizen representatives at large, supposedly as a "safety valve" to guarantee adequate and proper representation of both personalities and segments of the community not otherwise adequately represented by the original 140.

The commission is charged with the responsibility to formulate, conduct, and implement, a review and analysis of local government structure in Los Angeles County, and to recommend any solutions deemed necessary to more effectively or adequately serve the needs of the area, "bearing in mind that local government structure must be able to solve areawide problems; it must provide rights of self-determination in local affairs; and should be acceptable to and promote co-operation and good will between political jurisdictions."

To date, a number of meetings have been held, principally to organize the commission into working groups in an effort to promote the development of the study. Many believe that this is the beginning of an effective reorganization plan.

Other Metropolitan Studies

In 1956, a committee was organized in Fresno called the Fresno Metropolitan Study Committee. The committee was authorized by the city and county to study the feasibility of metropolitan government for their area, but to date has issued no reports. A consultant will be employed soon to conduct the study. Other areas, such as San Diego and Santa Clara, have been talking about metropolitan government recently, although no substantial progress has been made toward comprehensive studies.

CHAPTER IV

FUTURE METROPOLITAN GOVERNMENT IN CALIFORNIA: ORGANIZATION STRUCTURE CRITERIA

There is a definite trend toward increased recognition that a number of the services presently provided by numerous cities and special districts in metropolitan areas in the State of California could be better provided by a single centralized government. It would seem that some time in the not too distant future one or more of the areas presently studying or discussing metropolitan problems, such as Los Angeles, Sacramento, Fresno, and Santa Clara, will present a plan for metropolitan government to the Legislature to effect their study recommendations.

A prime factor for the Legislature to determine is, should each area be authorized to adopt a specific, tailormade plan for their area or should a single flexible plan be developed for the use of all areas in the State? This, of course, is for the Legislature to decide, but since the recent trend has been to standardize and provide a single authorization for a specific purpose when this will suffice, it might well be that a single authorization would also be desirable for establishing metropolitan government in California.

Of course there are numerous determinations that would have to be made and many problems resolved before a single plan could be adopted. It might well be that many of these would be insurmountable and a single plan would be found nonfeasible. However, it would seem that a close examination of the successful plans for metropolitan government now in use, as well as those proposed, could supply the necessary groundwork for establishing a single plan if sufficiently flexible provisions could be designed to meet all conditions.

AREA TO BE INCLUDED

A major point to consider is the extent of territory that would be authorized for inclusion within the metropolitan government. In many sections of the country metropolitan areas overlap counties and even states. However, the situation in California seems to be somewhat different in that most metropolitan areas, other than the San Francisco Bay area, are contained within a single county. At any rate, perhaps there should be some logical stopping point in regard to maximum size of the metropolitan government, and therefore many assume that the most feasible point at which to stop would be the present county boundary lines.

A new form of government in California, the metropolitan county, might prove to be the most feasible approach to the State's metropolitan government problems. One of the more complexing situations would seem to be how to administer those functions which are of such a nature as to require the crossing of county boundary lines. An out-

standing example is air pollution control where an entire area must be controlled according to its geographical and meteorological aspects, and of course boundary lines have little to do with this situation.

The services of this nature could continue to be administered by the special district device, or could possibly be handled by the metropolitan government under joint agreement with other jurisdictions.

The question then arises, what if the urbanized metropolitan area is considerably less than the territory comprising the county? Also, if it is to be authorized that a metropolitan area can comprise less than an entire county, how does the remaining portion of the county receive its traditional county services? It seems that answers to these questions would take a great deal of study. If less than the entire county is authorized for the metropolitan government, then the plan would have to be flexible enough to provide: (1) for local determination of the area to be excluded; (2) that the metropolitan government would provide the remaining portions of the county with their traditional county services and any other services which might be desired in the interim until they are urbanized to the point where they could join the metropolitan government; and (3) a simple procedure whereby the metropolitan government could expand within the boundaries of the county as the need became apparent.

In light of the aforementioned problems, a number of suggested factors pertaining to certain major component parts of an organization structure for a metropolitan government and deserving of particular consideration, will be summarized herewith.

GOVERNING BODY

Of principal importance is the method by which the people can control the operation of their government. It is believed that the representation afforded by the governing body might very well consist of three parts: (1) representation from the entire area so that the people residing outside cities can have a measure of control in the affairs of the metropolitan government.

Experience indicates that a workable policy-determining body is one with somewhere in the neighborhood of 11 members. It might be difficult to obtain good representation with a lesser number, and a larger number could result in difficult situations with regard to agreement on controversial issues. The metropolitan governing body in Toronto has 24 members; in Dade County, 11 members; and in the proposal for Sacramento County, 11 members.

It seems that each of the present metropolitan plans, except the Sacramento City-County merger proposal and the Nashville-Davidson County plan, retains the identity of the cities and provides them with representation on the metropolitan governing body; and most of the plans provide for about one-half of the governing body to be elected at large.

None of the present plans, however, as far as could be determined, provide for specific representation from the unincorporated areas. In most of the California metropolitan areas, if not all, there are large sections of urbanized unincorporated areas. It is felt that they should be given a voice in the affairs of the government serving them, in addition to the at-large representation which would actually serve the en-

tire area. Perhaps a single representative elected by and from the unincorporated area would be sufficient.

The city representation, if an 11-man board is adopted, should perhaps consist of five members. It might be desirable to set up a formula whereby the representatives would be elected by and from the councils of the participating cities on the basis of: (1) groups of cities according to the population; (2) on the cities within each of five area districts according to geographical location; or (3) simply from the city councils as a whole.

The remaining five members on an 11-member body could then consist of the board of supervisors of the particular county.

Another feature which may be desirable is a procedure for voting in accordance with the population represented. In this way, if a member represented, for example, 15 cities in the 10,000 to 25,000 bracket, the combined population of these 15 cities would be divided according to a prescribed formula, perhaps one vote for each 60,000 represented, which is a method similar to that used in the Metropolitan Water District Act.

FUNCTIONS TO BE PERFORMED AREAWIDE

There is, of course, little agreement as to which functions should be provided areawide and which should be provided by local government. Recent plans for governmental reorganization in metropolitan areas differ greatly in regard to the division of services. However, the services to be performed areawide generally include a number of the following: law enforcement, fire protection, health and welfare services, water supply, major sewage collection lines, sewage and garbage disposal, all nonlocal streets, areawide planning, civil defense, public transportation, tax assessment and collection, housing and redevelopment, metropolitan parks, libraries, industrial development, smog control, building standards, licensing standards and procedures, purchasing and schools. Of course there are many variations, and sometimes only a fractional part of a service may be taken over by the metropolitan government. For example, perhaps only minimum fire and police protection, or only the records, identification, and communications portion of the police protection services, are considered to be of areawide significance.

The services which many experts and most of the present proposals consider as purely local, and thus to be retained by the municipalities, are the following: local street construction and repair, local parks, local planning and zoning (within the areawide plan), local sewer and water lines, garbage and trash collection, building code enforcement, street lighting, licensing, etc.

Since there seems to be no set pattern, so that there could be authorization to perform any of the services which are in the above areawide classification, it would probably be desirable to start on a permissive basis. In this way the local metropolitan governing body could be given the power to adopt functions gradually as analysis establishes the economy and efficiency of such a move. It would also seem desirable to provide some means for citizen initiation for the adoption of new services by the metropolitan government.

FINANCING THE METROPOLITAN GOVERNMENT

Here again methods differ between plans. The Toronto method is by taxing the individual communities involved, by apportionment of the costs according to the value of taxable property in each unit. Member cities with a higher than average assessed valuation would no doubt resist attempts at setting an areawide tax levy since they might have to pay for considerably more service than they receive.

If the unincorporated areas are to be provided with traditional county services, and possibly a number of municipal type services in addition, it would seem that the County Service Area Law, amended to include provisions for capital outlay financing, would work sufficiently well. In this way a basic tax could be applied throughout the excluded territory by the metropolitan government for traditional county services, and service areas could then be established with a separate tax levy to pay for the supplemental services.

VOTER APPROVAL

Perhaps the fairest method of determining voter approval of the new government would be by majority vote throughout the entire metropolitan area. A valid related question is whether it would be morally correct to impose metropolitan government on a city although the people in that city voted unfavorably. However, by a majority countywide vote a single city or a few scattered cities could not block the effectiveness of the metropolitan government. This would also necessitate a state constitutional amendment to reduce the requirements of a two-thirds vote to annul a county charter.

Formation initiation of the new government could perhaps be by action of two or more local governments in the county which would be empowered to call for an election on the proposal, or by citizen initiation calling for an election. Here again many varying methods have been used and are being proposed.

If the functions to be initially undertaken by the metropolitan government are determined by the initiating group, action to undertake new functions should perhaps be similar to the procedure for establishing the new government, and also require a majority vote at an election. However, the previously mentioned recommendation whereby the metropolitan government governing body would be empowered to adopt new functions as it saw fit would seem to be most workable.

FUTURE COURSE OF ACTION IN REGARD TO METROPOLITAN STUDIES

In conclusion, it would seem that the preceding points could be worked out by committees comprised of representatives of various associations of local government, together with citizen groups and local government officials from the metropolitan areas of the State. A single plan for metropolitan government might or might not prove feasible, although this possibility certainly deserves a great deal of consideration.

Another important consideration is whether the Legislature should attempt to draft a plan to be presented to the metropolitan areas or whether the Legislature should wait until a metropolitan area submits a plan for them for adoption. This committee has thus far attempted

to keep abreast of latest developments so that it would have a solid background on the subject in the event a metropolitan area, such as Sacramento which has been studying the subject for some time, would present their plan to it for adoption. No attempt whatsoever has been made to draft a bill which would authorize a new form of metropolitan government.

There has been a significant development in other parts of the Country in this regard. The General Assembly of the State of Kentucky recently authorized a sum of money for its Legislative Research Commission to study problems of metropolitan areas with the view of determining the advisability of amending the Constitution in order to provide for a form of metropolitan government. Several other states, such as New York, Colorado, and Indiana, are reported to have shown a like interest in attempting to provide legislation which would resolve metropolitan problems. This development has been cited as the result of the present ineffective piecemeal approach to metropolitan problems as applied in most sections of the Country.

This committee sincerely hopes that the various efforts now being made in the field of metropolitan government will stimulate and encourage other local studies, so that a realistic plan for metropolitan government in California will reach fruition in the not too distant future.

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FINAL REPORT OF THE ASSEMBLY INTERIM COMMITTEE ON MUNICIPAL AND COUNTY GOVERNMENT

House Resolution No. 277, 1957

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LETTER OF TRANSMITTAL

HON. RALPH M. BROWN
Speaker of the Assembly
State Capitol, Sacramento, California

DEAR MR. SPEAKER: The Assembly Interim Committee on Municipal and County Government submits herewith the fourth in a series of final reports representing a field of study by the committee between the 1957 and 1959 Regular Sessions of the Legislature, according to House Resolution No. 277 of the 1957 Regular Session of the Legislature.

This final report contains the findings and conclusions of a study on the subject of functional consolidation conducted by the Subcommittee on Functional Consolidation of Local Government.

The report is divided into the three parts covering the principal fields of study: (1) The Findings of the Los Angeles City-County Consolidation Study Commission; (2) Fire Service Consolidation in Los Angeles County; and (3) County Contract Services.

Respectfully submitted,

CLARK L. BRADLEY, *Chairman*
WILLIAM BIDDICK, JR., *Vice Chairman*

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PART I

INTRODUCTION

The subcommittee on Functional Consolidation of Local Government of the Assembly Interim Committee on Municipal and County Government studied several aspects of the subject of functional consolidation during the 1958-59 interim: (1) the findings and conclusions of the Los Angeles City-County Consolidation Study Commission; (2) a proposed consolidation of fire services for the Los Angeles area; and (3) the advantages and disadvantages of county contract services. Therefore, the report will be divided into three parts covering these fields of investigation.

Functional consolidation has received its greatest impetus in Los Angeles County. County operation of municipal type services is something that has developed through the years, originally as an answer to the needs of the rapidly urbanizing unincorporated areas in the county and lately as an answer to metropolitan government. It should be noted that through the functional consolidation device, Los Angeles County has been able to achieve as much or more metropolitan government than several areas which have undertaken extensive metropolitan governmental reorganization.

It is the desire of the subcommittee to continue to study voluntary participation by local government in the consolidation of those functions best operated on an areawide basis.

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PART II

THE LOS ANGELES CITY-COUNTY CONSOLIDATION STUDY COMMISSION

In 1954 the Board of Supervisors of Los Angeles County and the City of Los Angeles appointed a commission entitled the Los Angeles City-County Local Government Consolidation Study Commission to study possible consolidation of functions between these two jurisdictions.

With a loaned staff, the commission divided itself into working groups and undertook an initial study of four functions: (1) street lighting assessments; (2) health services; (3) the office of public defender; and (4) parks and recreation. Reports were completed on all studies but that of the health function which was to be submitted at a later date.

STREET LIGHTING ASSESSMENTS

The study of street lighting assessments was perhaps less important than the other studies, but stood the best possibility of being adopted by the participating jurisdictions. The report indicated that the present system of billing and collecting street lighting assessments in the city was in need of improvement. It was felt that rather than try to improve present procedures under the city ordinance it would be more satisfactory for the city to enter into an agreement with the County of Los Angeles to collect street lighting assessments at the time of collection of the ad valorem tax.

In general, the study commission found that the following advantages would be derived from this action:

(1) Efficiency in the Bureau of Assessments will be increased by eliminating collection and related routine operations which now disrupt other functions of the bureau that constitute over 90 percent of its workload;

(2) The likelihood that taxpayers will fail to pay their street lighting and maintenance charges because of ignorance or oversight will be materially reduced;

(3) Officials of banks, trust agencies, escrow companies and law firms agree that consolidation of street lighting maintenance assessments with the ad valorem property tax will save their organizations many man-hours in title searches and clerical operations in processing and paying street lighting bills for their clients; and

(4) The county now possesses the most modern billing and collection equipment and increased service and efficiency can be achieved at a reduction in cost estimated to be $16,500 based on 1954 city expenditures of $227,000, or 7.3 percent yearly."

The chairman of the commission, Mr. Glendon Tremaine, testified that in his opinion this type of study is one in which a citizens' commission could be most effective:

> "The City of Los Angeles, as you perhaps know, practically alone collected street lighting assessment. This was not a function that the city wanted to do, or was really prepared to do, and we felt they should be collected by the county. I might say this is an illustration of the type of work that a commission of this kind might be effective in. This was not new. We didn't go off in a vacuum and suddenly come up with this as a bright idea. This was something that had been under consideration for a long time, but somebody has to get hold of it and recommend it and push it through—with the help of other groups."

It was pointed out by Robert Macy, Director, Bureau of Assessments, Department of Public Works of the City of Los Angeles, that contracts were being negotiated at that time whereby the county would collect the city's street lighting assessments in conjunction with the ad valorem tax they collect for the City of Los Angeles.

Contrary to the report conclusion, Mr. Macy felt that little or no savings would perhaps result from this action. This was brought out in the questioning of Mr. Macy by Assemblyman Carl Britschgi:

> **Britschgi**: Could you tell us what we are saving those districts? Does it vary from 1 cent to dollars, or what are we talking about?
>
> **Macy**: You mean what savings would result from what?
>
> **Britschgi**: From the consolidation of the tax collecting section we are talking about.
>
> **Macy**: Insofar as the studies that I have made are concerned, it would appear that there would be no monetary savings. It would be largely a convenience to the taxpayer in that he would not be getting bills annually in addition to what he normally has to receive for his taxes anyway.

PUBLIC DEFENDER

The report on the office of public defender recommended that the office of city public defender be abolished and that the county public defender represent indigents charged with felonies and misdemeanors in the municipal courts of Los Angeles. The commission felt that this would reduce expenditures for personnel, physical plant, and equipment, operational costs, and investigation. At the same time the commission believed that county operation of this function would promote speedier administration of justice in cases involving indigents in the City of Los Angeles. It was decided that no serious legal barrier would prevent this consolidation.

The Public Defender of both Los Angeles County and City testified at the hearing. Mr. Ellery Cuff, Public Defender of Los Angeles County, felt that if his department were given the function of defending misdemeanors for Los Angeles City, a problem would be created since very few other cities provided this service. People outside Los

Angeles City would then want the county to provide this service to them without charge.

Mr. Cuff expressed some concern in regard to the report recommendations:

> "As to any recommendations in this matter, I would like to make it known at the outset that I am absolutely neutral. I fear that if I were to recommend that it should be done I could be accused of being an empire builder; if I recommended against it, I could say that I was trying to get out of a lot of hard work. However, I read the report and I heard the report of Glen Tremaine today and thought it was a very fine report.
>
> "Now I have stated that there are some very few advantages, possibly on the preliminary hearing stage, and there is no need of repeating that.
>
> "At the present time I do not believe there would be much saving, if any at all, to the County of Los Angeles if the consolidation goes through.
>
> "As stated in my report, I have the highest regard for the city public defender's office and the way they are working now. A few years ago we did have a situation where there were more preliminary hearings carried through there, and then turned over to us later on. There are quite a few pleas of guilty taken in the municipal court by the city public defender and the cases sent up to us with complete memoranda on what they have been doing. To that extent that has been improved quite a bit and I think we have a very fine working agreement between us. Of course I do feel, and I think Mr. Leach had that in mind, too, that if a consolidation goes through, there should be adequate arrangements for taking care of city personnel. Take men who have dedicated their lives to the work of the city and possibly would be entitled to some pension provisions, and who now would have to go into the county and might have to retire before they are 70 years old without getting 10 years of service in, they would lose out very materially in the county pension program which is a very good one, of course. Those things I think would have to be considered in any consolidation plan. That would probably have to be done by a charter provision in the county—amending the county charter, and possible state law—I don't know."

The Los Angeles City Public Defender, Mr. George Chatterton, seemed to disagree with the report almost in its entirety. Mr. Chatterton stated, in part, as follows:

> "* * * I am in agreement with the commission (and this is another finding of the commission) respecting the cordial relationship existing between Mr. Ellery Cuff and myself. We have been friends for many, many years, but I do not believe that this should be considered as a factor upon which any argument for consolidation should be based.
>
> "May I reiterate that the only reasonable purpose of consideration is to effect economy and/or efficiency in government. It is my most serious contention that this will not be the case in the event that the commission's recommendations are approved.

"The effect of consolidation upon the individual rights of the employees of both city and county should be given serious consideration. Unfortunately there are definite variations in the pension systems of the two groups which, I presume, could be corrected by proper legislation either local or statewide. You, gentlemen, are the experts in that matter.

"I am somewhat fearful of the long-range effect of what is being considered here. Is it the desired ultimate result to abolish local city government in the State of California and delegate all governmental functions to larger legislative bodies who are more distant from the people whom they supposedly represent? This, in my humble opinion, would be a great tragedy indeed, for the direct responsibility of a public official to his constituents would be lost in the process."

PUBLIC HEALTH

The public health study conducted by the commission had not been completed at the time of the hearing, so that no conclusive recommendations were available. However, a provisional report was submitted and a number of observations were made, based on the mass of data collected to date by the health study group. Walter G. Gastil, a member of the Consolidation Study Commission, testified before the committee and submitted his viewpoints on the preliminary observation:

"We prepared an interim report and submitted it to the interested people and said, in effect, that we have become interested enough, and developed enough information to know (1) that it is legally possible to do so; it is legally feasible; and (2) we studied what is happening elsewhere and found that it is a statewide trend. We developed a series of potential benefits, but drew no conclusions. You might be interested in some of those. First, that it would be a better utilization of equipment and personnel; second, that it would provide the basis for the development of a superior program for the control of communicable disease; third, facilitate the standardization of policies and procedures relating to services rendered and conditions of eligibility (this would improve public relations with doctors and other agencies that have to make reports and referrals and simplify relations with individual citizens who seek public health services) facilitate the development of more uniform sanitation standards and enforcement procedures thereof (this should also improve public relations with businessmen who are subject to this type of regulation and sometimes have to pay taxes or licenses) improve reliability of vital statistics through established broader base for the compilation and through reduction of margin of error, reduce the cost to the taxpayer; and last, but not least, consolidation would provide a more equitable basis for the distribution of the cost of public health."

It should be pointed out that the Cities of Los Angeles, Pasadena, Long Beach, Beverly Hills, and Vernon are still providing their own health services at their own expense, although the remaining portion

of the county is served by the Los Angeles County Health Department which is financed out of general fund revenues. Therefore, the cost factor should add considerable significance to the health study. The trend in California, of course, has been for the counties to assume this function for the cities, with the above-mentioned cost factor as an incentive which has been provided for by the Legislature.

PARKS AND RECREATION

The fourth report dealt with the subject of parks and recreation. The report on this subject concluded that: (1) the county should not provide for parks on a regional basis; (2) that local parks in the unincorporated areas be financed through park districts; and (3) that the county furnish park services to cities desiring them by means of the contract system.

Testifying on the subject of the report, Harry Williams, vice chairman of the commission, made the following statement in regard to regional parks:

> "* * * We proposed that the distinction between regional and local (parks) be abolished. There are those who don't agree with us, but we find considerable disagreement as to what is regional and what is local."

Other witnesses representing county and city park departments had differing opinions. For example, Norman Johnson, Director of Parks and Recreation, County of Los Angeles, felt that the county should continue its current program of regional parks, but did not believe city-county consolidation of park departments would be feasible. Mr. Johnson submitted a statement from the Los Angeles County Park Commission on the report recommendation. Excerpts from this statement are as follows:

> "Basically, the Consolidation Commission recommends two principles:
>
> 1. That development and operation of recreation and park facilities by the County of Los Angeles and the City of Los Angeles will not be facilitated by any form of consolidation. The commission agrees with this conclusion.
>
> 2. That each jurisdictional unit within the County of Los Angeles—the county for the unincorporated area only, and each of the cities—retain individual responsibility for financing and operating park and recreation facilities, each within its own jurisdictional confines. The Consolidation Commission does not accept the validity of 'regional' parks supported by the county, the concept of regional parks being a county responsibility to be supported by the General Fund. It further points out that county park expenditures should be made only within the unincorporated area and supported solely by a special district property tax on the unincorporated area for park and recreation purposes. The Parks and Recreation Commission disagrees completely with this concept."

The Los Angeles County Parks and Recreation Commission believed that they would have to continue their regional park program for the following reason:

> "* * * major facility developments cannot be financed by the average jurisdictional entity in this community and that many areas of the county will be left entirely without regional facilities if such facilities are left to city financing."

The Parks Commission also believed that the so-called tax inequity cited by the Consolidation Study Commission did not take into consideration the fact that the imposition and collection of sales tax in the unincorporated area has financed the local park program in the unincorporated areas.

SUGGESTED IMPROVEMENTS IN THE ORGANIZATION OF CITIZEN STUDY COMMISSIONS

The hearing on these four reports by the city-county study commission brought out several important aspects: (1) a study of functional consolidation should include all cities within an area, rather than just the central city; (2) there was a strong feeling of cautiousness expressed in the testimony by department heads involved with the consolidation studies, which ties in closely with the fire chief attitude survey which will be discussed in Part III; and (3) there is a need for some method of carrying study recommendations to the people for action, rather than to local governmental officials.

The first point was brought out in the testimony regarding the office of public defender study. How to cope with the other cities if the county contracted with Los Angeles City to defend indigents charged with misdemeanors seemed to be a problem. Only the City of Los Angeles provides this service at present; therefore, if consolidation were effected, the county public defender believed that unknowing citizens in adjacent cities would be requesting the county to serve them also. It was felt that many services, such as police and fire protection, affect the entire area in many respects and should, therefore, be studied areawide, including both incorporated as well as unincorporated areas. Generally speaking, it is difficult for studies such as this to point out true advantages of functional consolidation when they are based on only a portion of the overall community problem.

The testimony at the hearing clearly illustrated a note of restraint and caution on the part of city and county officials. Those who were operating city departments believed that they were doing a good job and therefore could see no reason for agreeing with recommendations to consolidate their department with the county's. It would only be natural for some people to see little advantage to functional consolidation even though advantages exist. County officials, on the other hand, do not wish to stir up ill feeling and perhaps give people the impression they are hungry for more power; thus their testimony tended at times to be of rather limited value also.

Mr. Jess Swanson, Professor at the University of Southern California and Research Director for Mangore Corporation, brought this fact out in his testimony:

"* * * the need to identify the problem is very important, but perhaps the prime problem is the matter of how you carry something across because of the natural lethargy of entrenched bureaucracy; and I don't have to tell the members of the Legislature —you know by observation—that these types of changes come with extreme difficulty. As I sat here today, and I am being very candid, and observed how cautious different people were—and I'm speaking at the moment as a university professor—and noted how cautious the people were who came before you lest they say something which slightly trod on the toes of another, and particularly a fellow bureaucrat, believe me, if you are going to make some changes that are really vital in the organization and the processes of local government, you have got to have citizens' commissions that want the facts and are not afraid to state the facts when they get them, and have a license to press for some action once they have the facts."

Mr. Tremaine also made a number of observations in regard to the work of study commissions as a result of his experiences with the City-County Consolidation Study Commission. In his opinion, there is a need for a research organization of this type to function on a continuing basis, so that studies do not die when the study commission's appointment period expires. Mr. Tremaine cited a number of reasons which he believes accounts for the failure of citizen commissions, some of which are as follows: (1) a lack of "sales appeal" and failure to emotionally involve community leaders in appraising the problem and designing recommendations; (2) failure to enlist the support of elective officials; (3) failure to face political reality in the report recommendations; and (4) no available forces to push and pull the matter through the legislative mill.

PART III

FIRE SERVICE CONSOLIDATION IN THE COUNTY OF LOS ANGELES

In December of 1956 a report was submitted to the committee by the Federated Fire Fighters of California concerning the study which the organization conducted on the subject of consolidation of the fire services in Los Angeles County. This report was subsequently published as an Assembly Interim Committee Report in 1957. At the time the report was submitted, the Federated Fire Fighters requested a hearing some time during the 1957-58 interim to explain their views and findings on this subject. Therefore, the committee decided that during this interim the subject of fire consolidation would be explored in some detail.

The testimony by the fire fighter organization cited many advantages to functional consolidation of the fire services. It was pointed out that the tremendous influx of population into the county—an increase from 3,500 persons in 1850 to over 5,500,000 persons in 1957—presented an increasingly difficult fire protection problem.

The county now has 61 cities, 16 of which are only a few years old, and 46 of which are furnishing fire protection through their own departments. The pattern of municipal annexations has greatly confused the picture through the years. In fact, irregular city expansion has probably been the greatest contributing factor to the present problem of overlapping fire station facilities and inefficient fire equipment response in many areas.

DUPLICATION OF FIRE PREVENTION FACILITIES

It was pointed out that in a number of cases fire stations of different cities are located, or will be located, (proposed fire stations) only blocks apart. This is necessary since each municipal fire department operates as a self-sustained unit and the city must, therefore, station its equipment according to certain coverage standards as suggested by the National Board of Fire Underwriters. However, if the municipal boundary line could be removed these same N. B. F. U. standards would point out the expensive overcoverage of said areas.

Melvin Horton, Research Director, Property Owners' Tax Association, expressed his opinion on this situation at the hearing:

> "One of the most costly results to taxpayers of this condition is that cities, in order to obtain the best fire insurance rates, locate many fire stations close to each other across a common boundary. This wasteful practice of overcoverage in some areas is matched by a lack of coverage in others that can also be costly. Existing within our county are countless shoestring strips of land, islands, or just plain oddly shaped cities that cannot be protected adequately owing to the great financing burden it would place on the taxpayer."

FIRE SERVICE COMMUNICATIONS

The problem of inadequacy of the fire protection communication setup was cited by a number of witnesses as a good example of the need for areawide operation of the fire function. It was explained that there are approximately 25 different radio frequencies used by the numerous fire departments in the county. When a large fire occurs and response of equipment from different cities is necessary, quite often it is exceedingly difficult to co-ordinate fire fighting units. The lack of a uniform communications system can be exceedingly dangerous on a large fire and especially on brush or forest fires when units are located in remote sections of a mountainous area.

It was also pointed out that due to the large number of municipal fire departments, reporting of fires by the public is often confusing. Due to the patchwork layout of cities and unincorporated areas, many citizens do not know the proper jurisdiction to call in the event of fire. This often results in costly and unnecessary delays.

MUTUAL AID

The county contains two large fire departments, which are as large as all the rest combined, several medium-sized fire departments, and a number of smaller fire departments within its boundaries. Three-fourths of the total number operate less than three fire stations. The large fire departments operate quite satisfactorily under normal conditions, although they still must depend on one another for assistance for large fires. The smaller departments tend to rely to a great extent on "mutual aid."

The very nature of mutual aid, which depends upon a request for assistance when it is felt to be required, results all too often in critical delays in fire attack. It also often results in inadequate equipment being sent to assist, and of course is unreliable since the neighboring city or cities could have their own fires at the same time and not be in a position to send assisting equipment.

In regard to the value of mutual aid for day-to-day fire protection, Chairman Lanterman asked Mr. John Colton, District Engineer for the Board of Fire Underwriters of the Pacific, whether or not the county stations surrounding the new City of Downey, as well as adjacent city equipment, would assist this city's fire department in retaining their fire insurance grade established by the county fire department due to the availability of mutual aid. Mr. Colton answered as follows:

> "They would have some effect, but not as much as one might draw from your question. The fire service—the insurance people—don't think too highly of the value of protection that is available only after the fire has occurred and the city that finds it needs aid has to ask for that aid, and then at that late date of the occurrence of the fire, requests its response."

The final problem regarding mutual aid is that it is too often one-way from the large city to the small city. Some small cities rely to a great extent on their neighbors for their day-to-day fire protection, which means that the large departments are often subsidizing the smaller cities to some extent.

THE ACTUAL COST OF FIRE PROTECTION

One of the principal disadvantages cited by those who are against the metropolitan fire service concept is that the smaller city cannot afford the level of protection provided by a large fire department. The firefighters report, however, revealed that many of the small cities are presently paying as much or more for their fire protection than the large city. On the surface, it would seem that this is not so, but the extensive survey conducted by the Federated Fire Fighters noted that many cities were providing low cost service because their fire department budget did not include all of the costs of fire protection.

Captain Fred Smith, representing the Federated Fire Fighters Association, testified that their survey revealed the following items were not often included in the municipal fire department budgets: civil service charges, fire and liability insurance, city contribution to retirement, fire station construction costs, workmen's compensation insurance, hydrant purchase, installation, and repair, hydrant or water rental charges, capital outlay expenditures, etc. The list is quite sizeable.

Of the 41 cities surveyed, it was found that there was an average increase of $0.095 per $100 assessed valuation, and a variation between cities of $0.01 to $0.50 per $100 assessed valuation over the stated cost of fire protection. When the cost of fire protection is compared with the Board of Fire Underwriters' grade for each particular fire department, it would seem that generally speaking the larger fire departments are a much better buy for the citizens.

Another significant factor was brought out at the committee hearings in regard to costs of fire protection. The City of Downey withdrew from the County Consolidated Fire Protection District shortly after incorporation. The city council believed that they could provide better protection at a lower cost by setting up their own fire department.

Prior to withdrawal, the area comprising the City of Downey was served by two county fire stations located within the city boundaries and over 10 additional fire stations immediately surrounding the city, located within the response distance range approved by the National Board of Fire Underwriters. It should be noted that the National Board of Fire Underwriters' grade is the best available criteria to use in determining the quality of fire protection provided by a particular jurisdiction. The N. B. F. U. grade for the City of Downey when served by the county fire department was Class 4 for the city as a whole, and the fire department, judging such factors as location of stations, quality and quantity of personnel and equipment, training, etc., was given a grade of Class 2. Only one city in the county has a better fire department grade and that is the City of Los Angeles which is Class 1; one of only five fire departments in the United States with a Class 1 rating.

When the City of Downey formed their own fire department, they built two additional fire stations, purchased new trucks, etc., in an effort to retain the same fire insurance grade. The Downey Fire Department now has six pumpers, three fire stations, one rescue truck, one chief's car, and a total of 54 men. It seems that two of these pumpers are presently used as reserve equipment. The city does not have an

aerial ladder truck of their own, and must rely on neighboring cities for such equipment.

Several witnesses from the City of Downey testified as to the success of municipal operation of their fire service. Mr. Hollis Peavey, City Councilman, made the following statement:

> "In the new City of Downey we have an assessed valuation of $90,000,000, plus unsecured of $11,000,000. In round figures, if you will figure for ease of figuring the valuation of $100,000,000, based on the cost of what we would pay at the Los Angeles County rate, and which we were paying until we withdrew, it would figure about $630,000. The county had, within the City of Downey, one station, two fire trucks, and one rescue unit. The City of Downey has since built two additional stations. We have equipment, plus the rescue wagon, that we took from the county, and we are operating for $400,000 for the year. Now the basis of the actual costs show that the independent cities are operating at a less expense than they would were they to stay under the county fire protection."

However, examination of the current City of Downey municipal budget (1958-59) indicates the following fire department expenditures:

Grand total—fire department (Schedule E-60)	$522,970
Fire department—fixed assets Capital improvements (Schedule G-2)	75,000
Total budget	$597,970

According to the 1958-59 City of Downey Municipal Budget the combined total net assessed valuation is $115,968,897.

The correct tax rate for the City of Downey Fire Department would therefore be about $0.515 per $100 of assessed valuation. Further analysis would indicate that the present county consolidated fire protection district tax rate of $0.546 would perhaps be reduced approximately $0.02 if the City of Downey were still in the district and the assessed valuation of Downey were combined with that of the district.

In other words, even though the City of Downey has an above average assessed valuation and therefore would perhaps pay a higher than necessary amount for fire protection when the uniform district tax rate is applied, the city is nevertheless saving only $0.01 per $100 assessed valuation by providing their own fire protection. This also does not take into consideration the possibility that perhaps the recent survey of the city by the N. B. F. U., which has not as yet been released, might require additional fire stations and/or equipment and manpower in order to keep the Grade 2 classification that was established under county operation. This would increase the city's cost even more, or force their citizens to pay higher fire insurance premiums.

MUNICIPAL TAX ZONES

An analysis of Downey's fire protection costs illustrated the desirability of an authorization which would allow a fire district to establish a municipal tax zone whereby a municipality may be taxed for the level of service they desire, according to their assessed valuation.

Comparing the City of Downey's assessed valuation and population with that of Lakewood, it would seem that Downey should only pay approximately $0.35 per $100 to receive the same level of service, rather than the standard district tax rate of $0.546. However, the level of service factor makes comparison such as this difficult since Downey has a number of high value industrial sections which would require more extensive fire protection and thus increase the cost to perhaps $0.40 or $0.45.

An amendment to the County Fire District Act to empower districts to establish separate tax zones for this type of municipality would seem to be desirable. A uniform district tax rate provides a leveling of costs similar to that which occurs within a large city where both low value and high value areas are taxed equally, although the low value areas may comprise a high fire hazard and therefore be more expensive to protect. Since the cities may withdraw from a district when they so desire, it would seem more politic to provide for a variation in charges to cities according to the amount of service provided them.

The advantages of a consolidated fire service, in Los Angeles County at least, seem to be many. The very smallness of the majority of the municipal fire departments limits their capabilities on major or simultaneous fires which can result in much heavier losses than if a larger organization had jurisdiction. The present practice of each city taking care of its own fires often results in fire equipment of one city passing the door of a fire station in another city due to the criss-crossing of municipal boundary lines. Under a single areawide administration, the nearest fire equipment would respond to a fire. As a result, losses of property and sometimes of lives might be prevented.

Recent incorporations have thus far had little effect on the overall problem of fire protection since all but two of the 17 new cities have remained a part of and are being served by the Los Angeles County Fire Department's consolidated fire protection district. However, if a trend should start in future incorporations toward the establishment of additional municipal fire departments, the metropolitan fire protection picture would become increasingly clouded.

Mr. Horton of the Property Owners' Tax Association summed up his presentation on this subject with the following statement:

> "The conclusion is inescapable that we who pay for fire protection would be much better served by a single metropolitan fire department than we are at present. Both by a reduction in fire insurance rates and by the elimination of waste in the creation and operation of fire stations and engine companies, owners of property would be relieved of a substantial part of costs they now bear. That difficulties do exist in bringing about so sensible an arrangement—particularly in working out pension arrangements of employees—no one can deny, but the advantage of a unified fire fighting force would be worth a great deal of effort."

FIRE CHIEF OPINION SURVEY

At the special districts hearing in Los Angeles, August 28, 1958, a survey was submitted to the committee entitled "An Opinion Survey of the Fire Chiefs in Los Angeles County on the Subject of Unifying

All Fire Departments Into a Single Metropolitan Fire Department." The study was conducted by a private research and consulting firm, the John B. Knight Company, and sponsored by the International Association of Fire Fighters in co-operation with the Los Angeles County Fire Fighters Association.

In essence, the study concerned itself with the viewpoints of the fire chiefs in the county as to the need for unifying municipal fire departments into a metropolitanwide fire service, as well as their opinion as to whether or not they personally liked such unification. Forty-three of the 47 fire chiefs in the county were interviewed in this study. Three chiefs refused to co-operate, and one other is Chief of the City of Avalon Fire Department on Catalina Island and therefore was not considered in the study.

The method used by the Knight Company in their survey interviews is known as the depth interviewing technique. The questions were framed in such a manner as to obtain the inner motives that the chiefs had for their opinions. The study concerned itself with two principal areas: (1) an opinion of the need for unification; and (2) an opinion of whether or not the chief would go for unification.

The results of the survey seemed to indicate that most of the chiefs felt there were advantages of one sort or another to unification, although most of them sometime during the interview also doubted that there were advantages in their particular case. Approximately 92 percent of the interviewed chiefs stated that they have called for and responded to mutual aid. Most of these chiefs readily admitted that they often had to rely on outside assistance on major fires.

A significant result of the survey is that fire chiefs generally believed that a consolidation of the fire departments in Los Angeles County would be good for some areas. Mr. John Knight testified before the committee on this important fact:

> " * * * Without exception, every fire chief we interviewed admitted that consolidation or unification of the fire departments would be a good thing for other portions of the county than their own. In other words, they tended to say that we don't need it but it would be good in some areas of the county."

Of course the entire report involved the personal feelings of the individual fire chiefs who would be affected by unification. Therefore, many factors were involved in the answers given by the chiefs to the question of would a metropolitan fire department be good or bad for their area. Mr. Knight pointed this out in his testimony:

> "Now how do the chiefs stand on unification? Well, 10 of them are favorable, 14 are neutral, and 19 are against. On the basis of the total interviewed, it is apparent that the principal opposition to unification stems from personal status. Those who are neutral are in a period of watchful waiting; how are they going to come out? Those who are opposed see this as a very definite threat * * * to their status. The economic status doesn't enter this picture because all of the chiefs without exception felt that they would make as much money under a consolidation or unification as they do presently. So, it was the social status that they were concerned with, being a part of the politics, and so forth, of the city."

The Knight report merely set down in writing a commonly recognized concept—most people who are at the department head level will be extremely critical of any consolidation plan due to personal feelings that they would lose prestige, status, and perhaps certain vested rights. No doubt many of these people conscientiously believe that they are doing a good job and fail to see how metropolitan operation of their function could do better. However, personal feelings, it would seem, enter into their beliefs quite strongly and that is something which is very difficult to overcome.

At the fire districts hearing in Sacramento a letter signed by a number of the fire chiefs in Los Angeles County was read into the record by Lewis Keller, Associate Counsel, League of California Cities. The fire chiefs claimed that the report had little or no merit since the study was biased and facts distorted. However, the general conclusions of the Knight report seemed to be in agreement with other similar studies, and the fire chiefs rebuttal, of course, would be a natural result of the strong feelings associated with such an effort.

Reorganization on a voluntary functional basis would appear to be extremely difficult if left up to the department heads and other officials who naturally have such an emotional factor inherent in their opinions and decisions. This is why the members of the Los Angeles City-County Consolidation Study Commission recommended, at the hearings on their report recommendations, that the citizen commissions studying the feasibility of consolidation should have the power to carry their recommendations to the people.

PART IV

COUNTY CONTRACT SERVICES

The county contract system, sometimes referred to as the "Lakewood Plan," has been the most significant development to date in regard to providing areawide services in the metropolitan areas of California. It has been stated that through functional consolidation Los Angeles County has in effect provided as much or more metropolitan government than the widely heralded government of Metropolitan Dade County in Florida.

The machinery established by Los Angeles County for providing areawide services is based primarily on a system of voluntary contracts between cities and the county for certain services. The cities are charged according to the level of service desired and the actual cost of the service as determined by cost accounting methods.

At the present time the County of Los Angeles offers through 794 contracts, 41 services to the 61 cities in the county. Contracts with cities range from three in the older cities to as many as 30 in several of the newer ones.

It should be noted that this program is not new to Los Angeles County. The county started furnishing health services to most of the cities, for example, in the 1920's. Assessment and collection of taxes is another example of an older established areawide service.

THE LAKEWOOD PLAN

The "Lakewood Plan" was developed in 1954 when the City of Lakewood incorporated. Due to the threat of annexation by an adjacent older city, it was believed that incorporation would be necessary to preserve the identity of the community. Lakewood decided, therefore, to contract with the county for their municipal services. Mr. John Todd, Lakewood City Attorney, who testified at the hearing, explained the feeling of the Lakewood citizens at the time of incorporation:

> "Incorporation would preserve the Lakewood boundaries and at the same time give the citizens local home rule and more local control. However, by using the services of Los Angeles County, the same type of services the area had enjoyed, but at the level set by the local city council, could be continued. Again one of the biggest drawbacks to incorporation—large capital investment in establishing city departments and purchasing equipment—would be overcome. Another primary motivating factor was the fact that the government of Los Angeles County and its various departments was strong, efficient and well organized, thereby insuring ability to perform at the level needed by the proposed city.
>
> "With this background, the citizens committee for incorporation sold the issue of incorporation to the people on the basis of contracting with the county for the performance of municipal serv-

ices. It was sold, not as a temporary plan, but as a permanent plan of municipal operation."

Fifteen new cities have since joined Lakewood in the contract service program, although the services provided by contract vary between these cities to some extent. For example, one contract city provides its own police protection and another provides its own fire protection.

THE COST OF CONTRACT SERVICES

The charges for these services have been a controversial issue in the county since the conception of the Lakewood Plan. The older cities have continually questioned the contract charges for various services. Opinions have often been expressed to the effect that the rest of the county must be subsidizing the new cities. Mr. Arthur G. Will, County-city Coordinator, County of Los Angeles, informed the committee of the cost accounting system used by the county for this purpose.

> " * * * the county has adopted a policy of recovering all costs expended in providing services, not only to these new cities but to many of the older cities. The cost basis established by the Auditor-Controller Department, which employes a large number of very professional accountants, and several C. P. A.'s, includes not only all direct costs but all indirect costs, such as general overhead, county counsel, civil service commission, board of supervisors, salaries of the people in my office, myself, all retirement, workmen's compensation insurance costs, vehicle rental, depreciation, building inspectors, and what have you. Every attempt is made in establishing the costs that are charged for these services to insure that the full cost to the county of providing the service is recovered. There are certain services, of course, which have statutory limitations, such as the assessment and collection of taxes where the charge is $2.50 for the first $25,000 collected, and a quarter of 1 percent for the balance. The health service which has been provided by the county for many, many years to most of the cities at no charge other than the general county tax rate, as established by state law. So, there are certain of these services which traditionally, and from a statutory standpoint, have had different bases than actual cost."

Mr. Todd also discussed the Lakewood "free ride" accusation of the other cities in the county:

> "Charges have been made that Lakewood is receiving services from the county on a free ride, or partial free ride, basis since other cities within the county not contracting for services pay also county general taxes and thereby 'help support the City of Lakewood.' At the same time countercharges have been made (as well as charges by the same people who advocate the free ride argument) that Lakewood pays too much for many of its services. (See the remarks of Chester G. Jaeger, Mayor of the City of Claremont, before the Senate Interim Committee on Metropolitan Areas, December 23, 1957.) Obviously both situations cannot exist. In order to clarify this situation again, the true facts must be obtained. In

this regard, the following is submitted for your careful consideration.

"Before the City of Lakewood entered into the contracts with Los Angeles County, the City of Lakewood was required to be in a situation where it could completely pay to the County of Los Angeles for all of the services requested of the county. The county counsel insisted that the City of Lakewood be in such a situation because of the provisions of Section 31 of Article IV of the Constitution of the State of California, which prohibits a gift of public funds. For this reason the General Service Agreement with the County of Los Angeles contains the following clause:

"1. By reason of the limitations upon the expenditure of county funds provided for in Section 31 of Article IV of the Constitution of the State of California, said city shall pay to said county the entire cost and wages of all employees engaged therein, all supervision over such employees while so employed, a prorate of all departmental overhead, clerical work, office supplies, depreciation on machinery and equipment, traveling expenses, including mileage of employees, and all other costs and expenses incidental to the performance of each such function. The rate charged for overhead for each department shall be computed from time to time and revised accordingly, and thereafter charged at such revised rate. In computing the cost of the use of machinery and equipment, the full cost to said county of rented machinery and equipment and any operator furnished therewith, and a reasonable rental rate on county-owned machinery and equipment shall be included.

"Hours and days of debate and discussion, as well as grand jury investigations, can be spent in determining the method of cost computation. The fact remains, however, that the entire plan was based upon a cost basis and it was never the intention of the City of Lakewood or the county to supply the services other than at a cost basis. Conversely, on the other hand, the county is not in the business of making a profit, and as a result, the services are supplied on an actual cost or 'wholesale' basis."

It would therefore seem that any disparity in costs assigned to these contracts would be in accounting methods rather than policy.

THE ROLE OF OLDER CITIES IN THE CONTRACT PLAN

For the most part the older cities are a little awed by the wide scope of the program for supplying municipal services as practiced by Lakewood and the other 15 new cities in Los Angeles County. Most of these cities agree that it is advantageous for them to contract with the county for health service, building inspection, tax assessment and collection, etc., but get alarmed at advocation of contracts for fire and police protection, for example.

Excerpts from the testimony of Leroy Center, Mayor of Redondo Beach, points out his reasons for such alarm during questioning by Assemblyman Bradley of a proposal for the consolidation of five Bay area cities:

Bradley: Now do any of these five cities you are interested in contract with the County of Los Angeles for services?

Center: I believe all of them contract with the County of Los Angeles to a varying degree for services. I believe the City of Redondo Beach, of which I am mayor, has approximately nine contracts with the county for different services. None of these cities, however, contract with the City of Los Angeles for these services which I may refer to as basic home services, such as police and fire.

Bradley: Well, would you care to express to this committee your personal point of view as to what objection there would be to a city contracting with the county for fire protection, for example, as compared to your not having any objection to a city contracting for health services?

Center: Yes, I believe that there are certain services that are predominantly metropolitan in nature, or "regional" is a better word to put on it, such as health service. There are certain services which the county must provide as an agent of the State, and for which reason the county was in fact probably created in the beginning. There are other more personal services, such as police and fire, for which the municipality was created and formed for the people, and which is the reason why the people formed such an incorporated area. I think the nature of the service itself has some inference on what services should be contracted for and which should not be contracted for. Basically I have no argument with contract services as long as the person who is receiving the contract service, or the city that is receiving the contract service, is not, as Mr. Hahn put it this morning, getting a free ride. * * *

Mayor Center was then questioned by Chairman Lanterman as to the differences between municipal services provided by the county and services which would be provided after the five cities consolidated:

Lanterman: How do you segregate that? That is of interest to me. How do you segregate the intercity relationship from a county service that could apply across the five cities?

Center: The city was formed, and the principle of the formation of an incorporated city is so the people and persons living within that city will be able to have a direct voice in their government. The county was formed, I believe, to represent the State at a local level. The purpose for the formation of a city was to provide these services to the people at their control and at their direction. The combination of five smaller cities into one larger city will fulfill and further the purpose for which the original cities were incorporated, and does not abuse the principle in any way; but I believe that the changing of the purpose for which the county was originally created, to provide services which were intended to be provided by the city is an abuse of the principle, because it is then allowing the county to take on a different attitude, or a different complexion from that for which it was created.

HOME RULE ASPECTS

It would seem that the biggest objection to county contracts for the providing of major municipal services revolves around a fear that home rule will be lost to the municipality. Mr. Todd expressed his views on this important aspect of the Lakewood Plan:

> "The use of the contract plan does not mean an abolition of local home rule. The city council, in electing to use and operate under the contract system, set the level, the type, of services. Each contract has a clause whereby they can be terminated, in practically all cases except perhaps one or two, by election prior to the end of any fiscal year. In addition, under the contract the city may elect a level or type of service. Under the general services agreement, the city may by resolution request the county to perform certain types of services. For these services, they pay the cost, plus a certain percentage for indirect costs of overhead. The council, as a result, can therefore specify to the County of Los Angeles the level and type of service. This is not an abrogation of local home rule. All we did was simply substitute city departments, personnel and payrolls, for county departments, personnel and payrolls, to perform these municipal functions as contractual agents of the city, thereby eliminating a costly duplication.

THE CONTRACT SYSTEM AS APPLIED IN SANTA CLARA COUNTY

In addition to Los Angeles County, Santa Clara County and several others now provide municipal-type services to cities on a contract basis.

The County Counsel of San Clara County, Mr. Spencer Williams, submitted a report indicating that their county was equipped to perform the following services:

(1) Sheriff's patrol services;
(2) Prisoner housing in jail;
(3) Communications services;
(4) Engineering Services;
(5) Building inspection services;
(6) Planning services.

Their method of charges is quite similar to that of Los Angeles County, being on a cost accounting basis.

In conclusion, testimony at the various hearings on functional consolidation of local government would seem to indicate that: (1) the county contract system is working exceptionally well in the new cities as well as the older ones; (2) there seems to be no subsidy involved in the contract system since the actual costs of the service, including a pro rata share of the costs of administration, are charged to the contract cities; and (3) it seems that home rule has not been abrogated since the city council has the power to set levels of service and terminate any contract when they so desire.

It is therefore believed that the use of the county contract system of government could be encouraged throughout the State. The progress of the contract system has initiated a trend toward a more centralized operation of municipal services in metropolitan areas and is no doubt

a forerunner in many areas to an eventual governmental recognition on a metropolitan basis. The field of functional consolidation of governmental services would seem to have a high potentiality in solving governmental administrative problems and can result in increased efficiency and a possible reduction in cost.

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LETTER OF TRANSMITTAL

HON. RALPH M. BROWN
Speaker of the Assembly
State Capitol, Sacramento, California

DEAR MR. SPEAKER: The Assembly Interim Committee on Municipal and County Government submits herewith the fifth in a series of reports representing a field of study by the committee between the 1957 and 1959 Regular Sessions of the Legislature, according to House Resolution No. 277 of the 1957 Regular Legislative Session.

This final report pertains to the committee's study on the subject of incorporation practices. The study was a general review of incorporation law, and the motivation, feasibility, and problems of new cities.

Contained in the report are findings, conclusions, and recommendations of the committee on this subject.

Respectfully submitted,

CLARK L. BRADLEY, Chairman
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2—L-1104

SUMMARY OF FINDINGS

On the basis of information compiled during the committee's study of incorporation practices and problems, it would appear difficult to conclude that the current trend toward municipal incorporation is either good or bad per se. A preconceived view, also held by many experts in the field of government and local government officials, was that a number of these new cities perhaps should not have been allowed to incorporate. Cited as examples were those cities which incorporated principally to keep from being annexed to a neighboring city and turned to the incorporation laws merely to protect their "unincorporated" status. Other so-called problem cities were those which incorporated to exclude business and manufacturing, desiring to remain strictly residential in character. Of course this type of incorporation must sacrifice certain traditional city sources of income, such as the sales tax, alcoholic beverage tax, business license fees, etc. It was therefore believed that some time in the future many of these cities would be forced to consolidate with another city or disincorporate.

The committee's study, however, would appear to indicate that these fears can be allayed. There seemed to be few signs of dissatisfaction or serious problems besetting the numerous cities in the above classification. The principal threat to their continued existence would appear to be a possibility that several with an extremely low tax base could experience some difficulty if at some time in the future their citizens should demand a higher level of service; then it would be a serious problem only if there were no available means of expanding the tax base.

In general, the study pointed out that the laws pertaining to incorporation are satisfactory, although a technical procedural revision would no doubt be desirable. It is recommended that the Assembly Committee on Municipal and County Government, in approximately five years, again undertake a study of incorporation trends, problems, and procedures, with special emphasis on the cities analyzed in this study in an effort to ascertain the effectiveness of California's incorporation laws.

PART I

INTRODUCTION

One of the most interesting committee studies of the past interim period was on the subject of municipal incorporations. There are at the present time 352 incorporated cities in the State of California. Since 1950 there have been 45 new cities formed in the State. The sudden new interest in city government is most vividly shown in Los Angeles County where 17 new cities were formed during the past four years, whereas in contrast, only one city was formed during the 24-year period preceding 1954.

In addition to the sudden rash of incorporations, the socio-economic makeup of many of these cities seems to differ radically from that of the traditional city. The traditional city is usually pictured as a composite of central business district, perhaps some manufacturing, and the surrounding residential areas. The mercantile and manufacturing areas, due to their high value, broaden the tax base and thus greatly assist in supporting municipal services. Then too, the city receives a pro rata share of the state collected sales tax based on the sales of such businesses; in many cases, the sales tax revenues comprise a major portion of the city's income.

Completing the picture, the traditional city usually has a city hall, police and fire departments, a city jail, and a typical array of departments through which municipal services are provided.

The new cities, however, are often in sharp contrast with this picture. Many have little or no business areas, having been formed around housing projects, estate-type exclusive areas, or rural areas desiring to maintain their mode of living. Those municipalities without mercantile and manufacturing business must therefore exist without the usual revenue derived from such activity. This limits the city's income to the property tax and to certain state subventions.

A more unusual type of new city is the "City of Cows," several of which have been created to protect the dairy industry in Los Angeles and Orange Counties. Also there is an industrial city which has been patterned after the City of Vernon which had to use the patients in a mental institution to meet the minimum population requirements for incorporation. Both of these types of city have few residents and little interest in the usual city services.

Another interesting aspect is that much of the present incorporation activity either would not be feasible or would be difficult to achieve if it were not for the new concept of county contract services. A great many of these new cities have established only minimum "city hall" facilities as compared to the traditional city. They rely to a great extent on county government to supply their police protection, planning, jail facilities, building inspection, etc., and special districts for their fire protection, libraries, parks and recreation, and other services.

From this thumbnail sketch it can be readily seen that the new city often presents a somewhat different picture than the city for which the existing law governing organization and procedure was developed. Since the subject of incorporation, to the best of the committee's knowledge, had not been gone into before, it was felt that a good background of information on this subject would be of much value.

With this thought in mind, the Municipal and County Government Committee decided to conduct this study in an attempt to find the cause for the recent incorporation trend, to determine the progress which these new cities are making, and to learn of the problems which have arisen in the course of their short existence.

PART II

MOTIVATION FOR MUNICIPAL INCORPORATION

The factors that motivate people to incorporate was one of the principal aspects of the committee's study. Due to the large number of recent incorporations, it was felt that an analysis should be made to determine if there are any set patterns of motivation to the incorporation movement.

The study clearly indicates that there are none. Although there may be a certain driving force that stands out in a particular area's desire to incorporate—such as the fear of annexation—there are usually a number of motives, and these motives often differ between individuals and between groups; in fact, it is usually a combination of motives that result in the formation of a new city. For example, the chamber of commerce quite often has a desire to retain the identity of the community and thus it strives for incorporation when annexation threatens; a group of citizens might desire a higher level of a particular service, such as police protection, or be dissatisfied with present county or special district services; and perhaps still another group within this area might have experienced a recent increase in taxes and felt that they would be better off keeping their share of the sales tax revenues and receiving the city share of state subventions. Together, their motivations start a movement for incorporation, which is usually led by an organization such as the chamber of commerce. It would seem that there are certain motives which are stronger and more prevalent than others, however, and these will be discussed herein.

THREAT OF ANNEXATION

Perhaps the principal underlying motive in a great many of the recent successful incorporations has been a desire to keep from being annexed by a neighboring city. The City of Lakewood is an outstanding example. Long Beach had undertaken an enthusiastic annexation campaign to bring the newly built-up territory of Lakewood into their city. Several encircling shoe strings were annexed to the City of Long Beach which cut up the area into more feasible annexation increments, and slowly these areas were being annexed. It was pointed out by the City Attorney for the City of Lakewood, John Todd, that "the citizens of Lakewood were opposed to being annexed and being a part of an older city in which they would have no voice or control in respect to government and in which they would be saddled with the problems of an older city, some of which in this case were of a very serious nature." The citizens of Lakewood were satisfied with county services and out of their situation was born the "Lakewood Plan" wherein practically all municipal services are furnished by the county on a contract basis.

This same background could be applied to numerous other new cities in Los Angeles County and also Santa Clara County. In Santa Clara

County especially, where cities were competing for the annexation of lucrative territory, a number of areas incorporated to form a protective shield around themselves. The City of Monte Sereno was one of these. The Mayor of Monte Sereno, Thomas B. Inglis, testified as follows:

> "In general terms, Monte Sereno was incorporated to preserve its natural scenic beauty, its exclusively residential character and the quiet, rural pattern of living of its families. Incorporation was stimulated by the threat of piecemeal annexation into a neighboring city whose interests and objectives are not identical, or even similar, to our own. Annexation would have destroyed—or at least seriously impaired—many of the attractions which led most of us to take up residence in this area. It would have imposed upon us taxation for services which we neither wanted or needed—services which could not practicably be furnished to us in any case because of the terrain."

It is interesting to note that several of the cities in Orange County which were incorporated only a few years ago and did so to keep from being annexed by a neighboring city have since started on their own ambitious annexation campaign.

CONTROL OF LAND USE—ZONING

Quite often the threat of annexation motive is closely associated with a desire to control land use. Outstanding examples are the cities which incorporated to retain a rural mode of living and those which incorporated to protect and retain an estate type community. This fact was brought out by Mayor Burton Brazil of the City of Saratoga:

> "Concretely, the most important single function performed by cities is the control of land use. Everything else is determined largely by that control. The level and kind of public services and the cost of city government are dependent on the way land is used. Saratoga has definite and strong views on the way in which our land should be used and the kind of community we want to live in. These views are not shared by the ruling authorities of San Jose. The only way Saratoga could preserve its values, given this difference of views and the openly aggressive expansionism of San Jose, was to become a city at law as we were in fact. We did and we do not intend to be deprived of our independence."

Also in this category are the cities of Dairy Valley, Dairyland, and Cypress, which were incorporated principally to protect the dairy farms from infringement by housing developments, and the City of Industry which desired to set up an industrial community, perhaps to control taxes through an elimination of many types of municipal services. Both cities have a low population and minimum type government.

HOME RULE

The attractive home rule feature of municipal government is also closely related to the recent incorporation movement. Although not a pressing motive in most cases, due to the majority of the incorpora-

tions being of the aforementioned unusual types, in the traditional city this is still a prime motivation.

Even those cities that contract with the county for the majority of their municipal services jealously guard this concept. Many of the "contract cities" proudly acclaimed prior to incorporation that cityhood would provide them with a tool to closely control the level and cost of services without the need to expend large sums of money for equipment, buildings, etc., that would be necessary if they undertook to provide their own services. They pointed out that even though the county would continue to provide the services, the city could control the level of service through its contract and cancel the contract if dissatisfied with the service rendered.

COST OF GOVERNMENT

Another important motive for incorporation is the cost of government. This factor varies between communities and location in the State. In some sections costly special districts have been providing the majority of services to the urban fringe areas. By incorporating, these special districts could be replaced by more economical municipal services or a combination of municipal services and county contracts.

In other locations, such as Los Angeles County, the districts are often sound governmental units providing areawide services; therefore this particular motive for incorporation does not exist to as great an extent. However, since the advent of the Bradley-Burns Sales Tax Law, a number of areas have felt that by incorporating and keeping the sales tax in the area from which it originated, the cost of government could be reduced. This is possible to some degree since under the act the unincorporated area's share goes into the county general fund which benefits the entire county—unincorporated and incorporated areas alike, although county government endeavors to defray the additional services rendered these areas in the way of police protection and parks. This incentive is coupled with the state subventions that are allocated to cities. Through this type of income, a number of new cities have not had to levy a property tax as yet.

The City of Bellflower, a "contract city" in Los Angeles County, is an example of this situation. Mayor T. Mayne Thompson testified at the hearing as follows:

> "We have also had a chance during this past 10 months, the 10 months of our first year of operation, to definitely peg what our income is from sales tax, from franchise sources and the state subventions; we now know that it will be approximately $1,350,000. Our budget for this fiscal year which started just three weeks ago is $1,250,000. We hope to end up next July not only with the $750,000 surplus that we now have but add to that by a considerable sum."

When asked by Chairman Bradley if the City of Bellflower levied an ad valorem tax, Mayor Thompson answered that they do not, and in fact through the dissolution of a number of lighting districts and the disposal district, they will be able to reduce the tax bill an average of 44 or 46 cents in the coming year.

OTHER MOTIVATING FACTORS

Of course there are any number of other important reasons for wanting to incorporate. They vary as to their importance according to the given situation. Some of these are: (1) a dissatisfaction with county government; (2) a desire for more representation; (3) to gain leverage in dealing with the State for a given reason such as freeway development; (4) to block certain undesirable developments such as a dump or jail facility; (5) to satisfy the ambition of certain individuals with political ambitions; (6) to gratify a particular real estate developer for personal gain; and (7) the incorporation fever is catching, and at present it seems to be the thing to do.

It would appear that at least one of the above motives, a desire for additional representation, is a strong incentive in the more populous sections of the State. For example, in Los Angeles County there seems to be a strong desire for more representation in many of the previously unincorporated areas than was provided by the board of supervisors. The principal reason for this is that over 5,000,000 people are represented by only five supervisors. Therefore, through incorporation the citizens can have a local council which is much closer physically and psychologically, and continue to have services administered by the county through contracts.

PART III

THE FEASIBILITY OF CERTAIN TYPES OF NEW CITIES

Prior to the committee's study, some concern was expressed from a number of sources that many of the new cities would not be in a financial position to afford the normal municipal services and would therefore be in some difficulty in the near future. Often cited as the reason for this concern is the low tax base of many cities.

A number of recommendations were submitted to the committee that the Legislature amend the law to provide more stringent minimum requirements for incorporation. It was felt that perhaps a formula of minimum assessed valuation and population would be in order.

However, witnesses representing several of the smaller new cities were very emphatic in their statements concerning the rights of a small city to exist. The Mayor of Saratoga, Burton Brazil, was typical of numerous witnesses, especially in the Santa Clara area, who felt that the small city was in no way in trouble:

> "* * * First is the fallacy that a city is by definition a place modeled on New York or Chicago. The word "city" brings to the average mind the image of large numbers of people jammed tightly together in a relatively small area. It evokes mental pictures of asphalt, concrete, bright lights, noise, congestion, traffic jams, stores, factories, tall buildings, people in a hurry, faceless and nameless masses of humanity scurrying like ants in and out of concrete canyons. It evokes pictures of cliffdweller apartments and houses jammed together on lots so small your neighbor scratches when you itch. This is a true image, but it is not a true definition.
>
> * * * * *
>
> "Saratoga is predominantly a residential area in which country style living is the dominant pattern. About half the area is presently in agricultural uses. Commercial facilities are adequate for the present routine needs of our citizens, and are located in three separate shopping districts, each of which is near a corner of the city. There is a very small number of craft industries on a small scale, which were present prior to incorporation. The same may be said of multiple family dwellings.
>
> * * * * *
>
> "Saratoga operates a minimum service government on a property tax rate of ten cents per $100 of assessed value. Simple wants, conservative programming, and efficient administration make this economy possible. Contract arrangements for county services help reduce unnecessary overhead expenses without loss of local policy control.
>
> * * * * *

"The major problem faced by suburban cities, at least in California, is not, as many would have us believe, money. The citizen of suburbia believes that he can combine some of the values of rural life and produce a mode of life better than either. He is right; it can be done, and it has been done. It is not easy nor is it free. Valuable things never are. But the big problem the suburban community has to face is not the unreasonable demands of its citizens. It is the imperialism of the big city. Imperialism is the attempt by a political unit to extend its control over people of a different sort beyond its boundaries. Big cities habitually respond to the growth of smaller communities by trying to swallow them. If successful, the suburb is destroyed by excessive urbanization, its sense of community disappears, the big city gets bigger and its pride is restored and its problems multiplied. * * *"

The same reasoning was applied to another city in Santa Clara County, Monte Sereno. Mayor Inglis testified that his city had fewer headaches than they had anticipated and that they were doing fine as a city. He stated that Monte Sereno has no industry; no commercial enterprises; and no apartments, motels or duplexes; and that about 85 percent of the area is zoned for one-acre minimum building sites. It was pointed out by Mayor Inglis that his city received only $42 last year from sales tax.

However, the fear that the small city would perhaps in the future be forced to disincorporate or merge with a larger city due to an inadequate tax base was allayed by Mayor Inglis:

"Our opponents maintained that a city could not exist without commerce, and preferably industry, to broaden its tax base. This contention has been repeated so often that it has been accepted as axiomatic. But it just isn't so. Last year, typically, the tax rate of the industrial City of San Jose was $1.75 per $100 of assessed valuation; of the commercial City of Los Gatos, $1.15; of the residential Cities of Los Altos Hills, 25 cents, and of Saratoga, 10 cents. Monte Sereno operated in the black on a zero tax rate for its first full fiscal year and has set 15 cents as its rate for the present fiscal year. For a fair comparison, 35 cents for the fire protection district should be added to the rates quoted for the residential cities.

"* * * Our taxes in residential cities being lower, there has been grumbling from the other cities that somehow we must be getting a free ride at their expense. We've heard those words bandied about this morning several times. That, too, cannot be substantiated. We have a low city tax rate in Monte Sereno for three reasons:

"(1) We do not pay for services we do not get, nor need, nor want, such as curbs, gutters, sidewalks, street lighting, and police protection for nonexistent commercial establishments. We have no commercial establishments, therefore we don't need police to protect the plate glass windows and cash registers, and the juvenile delinquents assembling to see what mischief they can make.

"(2) We operate on an austerity budget, economizing in every possible way. For example, we made only one long distance telephone call during the entire Fiscal Year 1957-58. It is surprising what you can do with a 2-cent postcard (now 3 cents) if you suppress that impulse to pick up the phone and call Sacramento. Mr. Farrell can cite you an example of where I sent him a postal card and got back a two-page letter! Also a great deal of our city's work is done by volunteers. For instance, our city treasurer serves without compensation, as do the councilmen, of course.

"(3) Many of our services are performed by county contract so that the overhead is shared with other political entities. More of that presently.

"As for the alleged 'free ride,' I want to make the point that we pay for all services received from other than our own volunteer citizens. We have contracts with the county for public health, tax assessing, police protection and law enforcement, building inspection, and for limited planning and engineering services. The fees are either prescribed by state law, such as tax assessing, or are set by the county after thorough cost analysis."

Thus, witnesses at the hearings on incorporations seemed to generally agree that it is difficult to say whether a city is adequate or not in regard to its ability to afford "cityhood." It would seem that this very definitely depended on the particular area and the level of service desired by the citizens. While the size of the city, the level of municipal income, and the probable tax bill for city services are of vital importance to the area desiring to incorporate, it would seem that their incorporation poses no problem of statewide magnitude.

PART IV

PROBLEM AREAS

The problems encountered by groups desiring to incorporate or opposing incorporation were investigated at some length by the committee in an effort to determine if changes were needed in the present law governing incorporation procedure. Also, the problems of new cities within five years following incorporation were a part of the committee inquiry.

It appears that California's present incorporation procedure is workable and one that protects the rights of self-determination of all parties, persons, groups, and agencies, within the community. The procedure of initiation would seem to recognize both property and personal interest in local government and generally represents a sound policy.

However, a number of problems were presented to the committee, often together with suggested solutions, relating to the general topic of incorporation and problems of new cities. Perhaps the more frequently mentioned problem was in regard to the feasibility of incorporation studies and reports which are usually financed by private or local committee subscription. Also frequently discussed were the following problems: (1) provision by the State for a "dry period" loan to finance new city operation immediately following incorporation; (2) redefinition of the minimum population requirements for incorporation which at present is 500 inhabitants; (3) the 90-day exclusive incorporation notice of intention period wherein no annexation can take place while an area is considering incorporation; (4) an initiative procedure clarification so that citizens will have a means to call an election on city council decisions that they feel are contrary to the desires of the majority; (5) control of unwise incorporations and annexations; and (6) a general technical revision of the statutory procedure for incorporation.

FEASIBILITY STUDIES AND REPORTS

One of the biggest headaches involved in many movements for incorporation centers around this subject. Nearly all incorporation initiating groups will start their drive off by retaining a private firm to make a study regarding the benefits, cost, savings, and even citizen attitudes involved in the possible incorporation of a particular area. This provides the needed ammunition to carry out a successful campaign.

In recent years public relations firms have often been used to carry out a complete professional selling job for the incorporation-minded groups or individuals. Thus, for a stipulated sum of money a public relations firm will usually lay out an advertising campaign, file the necessary legal papers, hire a firm to make an analytical study of incorporation feasibility, perhaps hire another firm to get the required

number of signatures so that the area qualifies for incorporation, and, in essence, make an all-out attempt to get the community incorporated.

Then quite often the opposition groups will attempt to conduct a survey of their own to determine the costs, benefits, and possible disadvantages of incorporation. In fact, some areas end up with four or five reports which are often quite conflicting due to the slanting of results to suit those conducting the survey or paying the bill for the survey. This leaves the average citizen in a quandary since he finds it difficult to determine which is correct.

The "community relations" firms aspect of incorporation was clarified by Mr. John M. Johnston, whose firm, John M. Johnston and Associates, has recently assisted in the incorporation campaigns of Garden Grove, Paramount, Bellflower, Rolling Hills Estates, Pico Rivera, and four other areas. Assemblyman Lanterman brought out the function of the community relations consultants in the following testimony:

> **Lanterman**: What technical service do you render? What is your procedure?
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> **Johnston**: We take the campaign from the beginning and handle all phases of it. The only thing the local committee usually has to do is raise the necessary amount of money to pay the necessary bills.
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> **Lanterman**: On what basis do you make the charge—on population, petition number, or what?
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> **Johnston**: You mean our fee or the total budget?
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> **Lanterman**: Your fee.
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> **Johnston**: Our fee is a fixed amount per month. It's time, knowledge and ability in a flat fee. There is no percentage, nor, as one man said to me, would you take it on a contingency, and I said yes, but you couldn't afford it.
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> **Lanterman**: What technical advice do you have in your staff, or do you hire it?
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> **Johnston**: Well, from time to time we associate with such agencies as Junkins-Voight, John B. Knight and Associates, James O. Stevenson and his Los Angeles Bureau of Municipal Research; whatever special talent a group has, from time to time we use those.

Mr. Johnston pointed out that it is usually the chamber of commerce in each of these areas which collects the money for incorporation and leads the movement. He stated, "We have worked through the chamber of commerce because this is normally the place where the preservation of community identity would have its most important place." According to Mr. Johnston, there are three firms in the Southern California area in the community relations field specializing in incorporations.

Of course there are also a number of firms which specialize in the initial analysis and reporting field. Mr. Johnston stated that the fees for these professional studies cost the community from $2,000 to $10,000. As explained by Mr. Robert Gold, research consultant, the firms doing the reporting on feasibility do not have as one of their functions the selling of the idea, as in the case of the community rela-

tions firms. Mr. Gold testified as to his particular firm's viewpoint on this, as follows:

> "* * * We attempt to obtain factual information, to analyze it, and to present it to the client, and we are in no sense a protagonist for a point of view which the client had before we arrived on the scene. In other words, we are an analyst and not a purveyor or a seller of an idea * * *."

The basic problem associated with incorporation feasibility reporting is that the citizens within a community do not know which report is correct. In some areas, Los Angeles for example, the county also issues a report which might be termed the more neutral of the feasibility studies. The county report is purely a factual presentation of the characteristics of the area under consideration for incorporation. These reports, however, are not issued until some time after a successful petition requesting an incorporation election has been filed with the board of supervisors.

A number of suggestions were made to resolve the problem, including one to authorize the State Local Planning Advisory Committee to submit an impartial study, but witnesses could not seem to agree in the advisability of this or any of the other suggestions.

Another interesting sidelight to the employment of outside firms to research the feasibility of incorporation was the operation of one company, Louis Kroeger and Associates, which assists the city after a successful incorporation movement. Mr. Kroeger explained that one of the services his firm performed was to act as sort of an interim management after incorporation. In this manner members of his firm were sometimes installed as temporary city clerks, or city managers, to assist in operating the city, and the firm was also in a position to advise the new council on necessary ordinances, temporary financing, and other details, based on previous experiences with other new cities.

Also, the community relations firms, such as Johnston and Associates, are often retained, although on a different basis and for public relations work only, after incorporation of many of the cities in which they led successful incorporation campaigns. These firms act as consultants to the mayor and councilmen for from three months to a year after incorporation.

DRY PERIOD FINANCING

Another problem presented to the committee relates to the financing of cities immediately after incorporation. Witnesses pointed out that city councils are faced with a period immediately following incorporation during which little in the way of municipal revenue is forthcoming and, of course, immediate demands for cash are great. Salaries of the new city's employees must be paid, etc. At present loans are made from banks or from the county. Mr. Lewis Keller, Associate Counsel of the League of California Cities, suggested that a State Loan Fund would be desirable:

> "As many of you know, city councils, immediately following incorporation, are faced with a long dry period during which very little in the way of municipal revenue is forthcoming, and

the immediate demands for cash are very great. Available methods of dry-period financing in a newly incorporated city are adequate but the cost of money is substantial.

"It is therefore proposed that a state revolving loan fund to be used for financing newly incorporated cities during their first few years of corporate existence with loans to be repaid to the State on a 'cost of money basis' would serve a valuable purpose."

MINIMUM REQUIREMENTS FOR INCORPORATION

It was suggested a number of times that there be more stringent minimum requirements in the law regarding incorporation. One of the principal problems in this regard has been the requirement of 500 inhabitants to qualify for incorporation. Mr. Gold believed that ambiguities in the present law should be clarified so that "inhabitant," as the word is now used, is changed to something more meaningful, such as "registered voter." The reason behind this suggestion was brought out by Supervisor John Anson Ford of Los Angeles County. Mr. Ford informed the committee of a situation in his county which pointed up the need for clarification:

"We don't have any power except to check as to boundary accuracy, and to be sure that they have 500 inhabitants. Now the absurdity of that too has perhaps been brought to the attention of some of you. We had one community that proposed to incorporate and it didn't appear to have 500 inhabitants, but they made a count, and included 126 people in a mental institution, which enabled them to get by."

Assemblyman Winton also brought out the absurdity of this provision in questioning Mr. Gold:

Winton: We heard about the people in the rest home, or whatever it was. I think if you had a boys' school located in an area that they could also count them as residents, or something of the sort.

Gold: At the present time "inhabitants" doesn't say it has to be a person over 21, or even a citizen of the United States, or even a competent person.

Winton: Well, up in my area we have some of these Mexican National camps where they bring workers in. You could have an awful lot of inhabitants there. * * *

Gold: For a short time maybe yes, on a quickie basis, say in western Fresno County.

FILING PERIOD

Several witnesses brought up the problems associated with the filing procedure for incorporation and the procedure following an unsuccessful election. It would appear that the several sections should be revised in an effort to clarify and remove ambiguity, as well as carry out the intent of the law to a greater degree.

First, the present procedure for notice of intention to circulate petitions for incorporation provides that "not more than two such notices

affecting the same, or substantially the same, area shall be filed within a period of one year." Another section states that no further notices of intent to circulate petitions for annexations or any other incorporations may be filed for a period of 90 days after the filing of a notice of intention as above.

It would appear that these provisions have not been too difficult to overcome. As an example of the problem, the following excerpt of testimony has been included herewith. Assemblyman Hegland asked Mr. John M. Johnston whether an area desiring incorporation had protection from a neighboring city so that the higher assessed valuation areas of the community would not be annexed away from them while they were contemplating incorporation.

> "I can't answer for Del Mar; I don't know the specifics, but had the people in Del Mar desired, they could have filed a notice of intention which would have protected them for 90 days, and then another group could have filed for another 90 days, and another group, an ad infinitum. Like changing boundaries, changing groups—they could have had all the protection they needed, but if the local group isn't ready to move, you cannot hold them in abeyance while they make up their minds, say in 5 or 10 years from now. This is often the case in a boundary hearing in an incorporation. A neighboring area will say, well, we haven't made up our minds whether we want to incorporate or not but you've got a square mile or two of area encompassed in this map which we wish you would exclude while we think about it. They have plenty of legal methods now."
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> **Hegland**: In other words, you can hold off a city for 90 days then by this statement of intent.
>
> **Johnston**: Certainly. Sequentially, as long as you are smart enough to move fast enough. This has been done in the case of La Mirada which filed just this morning. This is a case in point. Your committee being interested in corporations, here is the one that has tried either four or five times. It once went to an unsuccessful vote, and just this morning they have filed again. We think their petitions, which we were examining, will be sufficient and so they will be off on their fourth or fifth try. I have nothing to do with it by the way. Now they have held off everyone in that area for the past year and a half or two years by simply filing and refiling.

As indicated by the testimony, this same refiling situation applies to an area that has had an unsuccessful incorporation election. This particular section provides that no further proceedings for the incorporation of the same, or substantially the same, area shall be initiated for two years after the date of the election. However, in practice the boundaries are often simply changed to some small degree and further action initiated almost at once.

It would therefore seem that these sections are either in need of repeal—since they do not seem to be carrying out legislative intent—or they should be further clarified.

UNWISE INCORPORATION

Many witnesses seemed to feel that new cities have been formed recently which are not to the best advantage of the community. One of those cited as an unwise incorporation is a city which is only a few blocks wide but nearly 10 miles long. It was formed, it seems, to provide an area for industry to locate in which there would be a very low tax rate since the municipal services responsibility could be practically eliminated.

It was pointed out that such cities ignore the moral responsibility of the community since nearly all of the workers live outside the city, and through incorporation the industry located within this type of city can ignore their social obligations, such as the education, cultural and social aspects of being part of a large community.

A number of witnesses suggested that new powers to control unwise incorporation, and, in fact, even unwise annexation, should be given to some urgency. One suggestion was to broaden the powers of the county boundary commission so that it would fulfill this function. At present the county boundary commission merely checks the legal description of the territory to be incorporated.

Another suggestion was to empower the Local Planning Advisory Committee to review and approve or disapprove all incorporations. Due to the magnitude of the workload that would result from this suggestion, it would seem that only those incorporations which were obviously bad should be referred to the committee. It would seem that the county or the boundary commission might screen incorporation attempts, and those which were believed to be against the best interest of the people concerned could then be referred to the Local Planning Advisory Committee of the State. The two prime factors which would need to be considered are what would the cost of such a procedure be, and would the state agency be sufficiently acquainted with the local area's problems to do the best job?

REFERENDUM PROCEDURE IN REGARD TO MUNICIPAL SERVICES DECISIONS

A unique problem seems to have occurred in several of the new cities located within counties providing contract services. It appears that in several areas during the incorporation movement announcements were made to the citizens by proincorporation groups and city council candidates to the effect that services would continue to be provided by the county under the "Lakewood Plan" after incorporation. Then, following incorporation, the new city council decided that the city should terminate county contracts and provide its own services.

The citizens in at least one city protested this action of the city council by means of a referendum calling for an election on the question. However, existing law seems to provide that the referendum does not apply to this type of situation. Several witnesses believed that they should have the right to vote on such an important decision, and therefore that referendum action should apply in this case.

This obviously would necessitate a revision of the initiative and referendum sections in the Elections Code. It would perhaps be desirable to undertake a future study of this problem in an effort to reach some fair method by which the citizens within a new city could reverse such important city council decisions if they were felt to be detrimental to the community.

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SPECIAL DISTRICTS IN THE STATE OF CALIFORNIA: PROBLEMS IN GENERAL AND THE CONSOLIDATION OF SEWER AND FIRE DISTRICT ACTS

FINAL REPORT OF THE ASSEMBLY INTERIM COMMITTEE ON MUNICIPAL AND COUNTY GOVERNMENT

House Resolution No. 277, 1957

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LETTER OF TRANSMITTAL

HONORABLE RALPH M. BROWN
Speaker of the Assembly
State Capitol, Sacramento, California

DEAR MR. SPEAKER: The Assembly Interim Committee on Municipal and County Government submits herewith the sixth of a series of final reports representing work of the committee between the 1957 and 1959 Regular Sessions of the Legislature, in accordance with House Resolution No. 277 of the 1957 Regular Session.

This final report represents the findings of the Committee's study of: (1) a possible consolidation of district laws pertaining to fire protection and sewage disposal; (2) methods of coping with the multiplicity of special districts; and (3) the community services district act.

Contained in this report are the findings, conclusions, and recommendations of the committee on these subjects.

Respectfully submitted,

CLARK L. BRADLEY, *Chairman*
WILLIAM BIDDICK, JR., *Vice Chairman*

CARL A. BRITSCHGI
ERNEST R. GEDDES
SHERIDAN N. HEGLAND
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SUMMARY OF FINDINGS

The committee's study of special districts centered around its continuing project of examining special district laws relating to a specific function in an effort to repeal little used district acts and to consolidate acts where this is feasible so that only one or two district acts pertaining to a function will remain. During this interim the committee considered fire district and sewer district acts with this result in mind.

In addition, the committee heard testimony many times on the subject of special districts in general—the multiplicity of special districts, the problem of the independent special district, and a proposed metropolitan fire authority law.

I. FIRE PROTECTION DISTRICT ACTS

1. The law presently authorizes a fire protection district to form under the provisions of four fire protection district acts.
2. Only two of these acts are being used extensively, the County Fire Protection District Act and the Local Fire District Act.
3. These two acts are quite similar in their provisions and operation with one major exception—their type of governing board.
4. The local fire district is governed by an independently elected governing board, while the county fire protection district is governed by the county board of supervisors or a board appointed by them.
5. In general, witnesses at the hearings agreed that these two fire district acts could be consolidated if some provision were made to retain both types of governing bodies.

II. SEWAGE DISPOSAL DISTRICT ACTS

1. The problem of reducing sewage district acts was the more difficult one since there are nine single purpose sewage district acts, as well as five multipurpose district acts which include sewage disposal as one of the authorized functions.
2. The committee's study revealed that of the nine single purpose acts, five are either not being used or are being used by very few districts.
3. There are two major sewer district acts, the County Sanitation District Act and the Sanitary District Act.
4. Witnesses generally agreed that the two major acts should remain as they are and that the five seldom used acts should be repealed.
5. It was also recommended that maintenance provisions which are now found in three acts in two different codes be consolidated into a single act if possible.
6. It was determined that separate study should be devoted to the five multipurpose district acts at a later committee study.

III. PROBLEMS OF SPECIAL DISTRICT ORGANIZATION

The problem of special district organization, especially that of the independent special district, received a large share of attention at many of the committee's hearings despite the fact that this topic was often not directly related to the subject under consideration. This perhaps attests to the importance of the problem.

1. It was pointed out that county government has no control over the operation of the independent special district, although the board of supervisors is usually thought of by the public as being responsible for their proper functioning.

2. County government finds it difficult to effect consolidation or administrative centralization of particular functions of the districts they operate, due to the interspersion of the often numerous independent district.

3. It was generally believed by witnesses that county government should be provided with the tools to cope with such districts which are often overlapping, have insufficient tax base, operate inefficiently, etc.

4. Several witnesses suggested that a moratorium be placed on independent special district formation until methods have been studied and provided for in the law to cope with this type of district.

   Two principal recommendations were offered by witnesses as a solution to the problem of special districts: (1) convert all independent special districts to county-operated districts administered by the board of supervisors; and (2) authorize special district committees for each county for the purpose of investigating district organization as to the feasibility of a particular district formation, consolidation of inadequate districts, realignment of boundaries, etc., with the power to call for an election on their recommendation.

6. One solution to the special district problem was offered by proponents of a proposed metropolitan fire authority law which would authorize the board of supervisors in each county to activate an authority which would operate all fire protection districts within the county. In addition, there would be provisions in the proposal to include cities in the active authority and provide them with representation on the governing board.

RECOMMENDATIONS

On the basis of evidence presented to the committee by witnesses in the course of the hearings, as well as research work independently conducted by the committee staff, the following recommendations are hereby submitted:

1. The two major fire district acts, the Local Fire Protection District (HS 14001-14306) and the County Fire Protection District Acts (HS 14400-14598.5), should be combined into a consolidated Fire Protection District Act of 1959. Provisions for such consolidation should follow the procedure followed by the committee in the consolidation of the Park, Recreation, and Parkway District Acts,

culminating in the new Recreation and Parks District Law enacted at the 1957 Regular Session of the Legislature.

2. The two Fire Protection Districts in One or More Counties Act (HS 14600-14766) and the Metropolitan Fire Protection District Act (HS 14325-14375) should be repealed.

3. The Sanitary District Act and the County Sanitation District Act should remain in their present form. It is felt that their complexity, as well as the wide scope of operation of many of the districts formed under their provisions, would make the consolidadation of these two acts extremely difficult. However, it would seem desirable for these acts to be restudied more extensively in the future to further ascertain the feasibility of consolidation.

4. The following five acts pertaining to sewage collection and disposal, which have seen little or no use, should be repealed: Municipal Sewer District Act of 1939 (Deering-1939, 24:37; D.A. 5192a); Sewer Districts in Unincorporated Territory (HS 4659-4667); County Sewerage and Water District Act (HS 5500-5656); and the Regional Sewage Disposal District (HS 5900-et seq).

5. The various acts containing maintenance district provisions, the Sewer Maintenance District Act (HS 4860-4926) and the Improvement Act of 1911 and the Municipal Improvement District of 1913, should be consolidated into a single Maintenance District Act of 1959.

6. It would seem that additional study should be given by the committee to the extensive problem of the independent special district. Recommendations as presented by numerous witnesses to hold the line on further formation of such districts until future study reveals a solution, as well as recommendations to establish county committees for the purpose of studying districts to determine the need for consolidation, feasibility of formation, etc., should be given serious consideration by the Legislature.

7. The proposed Metropolitan Fire Authority as presented to the committee at its hearings seems to be an excellent solution to several problems; (1) it appears to solve the fire protection organizational needs in metropolitan areas in that it provides a means for the consolidation of fire protection agencies within a metropolitan county, encouraging municipal participation by providing a fair method of representation, and (2) it provides a method for any county to consolidate its fire protection districts, thus offering a solution to the problem of special district multiplicity.

PART I

INTRODUCTION

In conjunction with the rising cost of government, the problem of special purpose districts has received a great deal of attention in California. The number of special districts has increased at a phenomenal rate, for the most part to take care of the municipal type service needs of the rapidly growing unincorporated fringe areas. The extensive scope of this form of local government can be readily seen by a comparison of their number with that of the other two basic units of government in the State. There are 58 counties, 352 cities, and at last count almost 2,800 special districts [1] (not including school districts, districts within municipalities, and some reclamation districts).

A good example of the expanded use of the special district device can be found in Sacramento County where in 1920 there were 35 districts; in 1950, 101; and February of 1957, almost 160. In area, these districts varied from a few acres to that of the entire county.

The large number of districts is partly accounted for by their authorization to perform only those functions that are set forth in the enabling act under which they are established, and for the most part districts are limited to a single function. This is in direct contrast to the numerous authorizations available to city and county governments. Another factor contributing to the large number of districts is that many of them are quite small in size.

An important facet of the district problem is that nearly 1,700 of the 2,800 special districts in the State are governed by an elected governing board and therefore enjoy a high degree of local autonomy. This local autonomy does not always provide the grassroots control that it is presumed to since district government tends to be confusing to the citizen. The citizen is often at a loss to know where to go to register a complaint, which district is providing what service, and what the tax dollar is being spent for. In order to be a conscientious citizen, residents of some areas would have to keep up with the activities of as many as 10 or 12 governments. Poor district voting records indicate that the average citizen has little interest in the day-to-day activities of districts, probably due to the large number and their small-scale operation.

It must be noted that special districts are simple to create and can provide a needed service to areas that in most cases could not otherwise be provided for. Many special districts seem to be excellently administered, have a low tax rate, and provide efficient service to not only unincorporated areas but to incorporated areas as well. In fact, a number of districts operate successfully on a regionwide basis.

However, it is widely recognized that far too many districts have a poor tax base, a limited scope of operation, are overlapping, etc., causing an undue tax burden on the recipients of their services, and there

[1] *Annual Report of Financial Transactions Concerning Special Districts of California*, Fiscal Year 1955-56, Robert C. Kirkwood, State Controller.

seems to be no satisfactory method to cope with the problem in the existing law.

In addition to the multiplicity of special districts, there is the problem of a multiplicity of special district laws. Districts may be organized under 135 current authorizations. Many of these laws pertain to the same function; for example, there are four fire protection district laws, nine single-purpose sewage disposal district laws, and prior to 1957, four park and recreation district laws. In addition, there are numerous multipurpose and some metropolitan district acts which are authorized to perform the above functions.

The Municipal and County Government Committee started its study of district laws in regard to the possible consolidation of those pertaining to a particular function in the interim between the 1955 and 1957 Regular Sessions of the Legislature, at which time the four park and recreation district laws were studied. This study culminated in the introduction of committee sponsored legislation which was successful at the 1957 session. There is now a single consolidated park, recreation, and parkway act to take the place of the four previous acts, and a metropolitan type park district act which study indicated should not be included in the consolidating bill.

A method was devised by the committee to provide alternatives for several types of governing boards, various methods of initiating district formation, etc., so that the desired flexibility could be retained. However, the numerous procedural requirements were standardized for park districts by the consolidation effort, and it is hoped that the same standard set of procedures can be adopted for each of the future consolidating acts so that eventually all districts will be identical in this regard.

This report will include the findings of the committee in its study of district laws that pertain to the function of fire protection and sewage disposal, and will also include recommendations made at various committee hearings in regard to methods of solving the special district problem.

PART II

CONSOLIDATION OF FIRE PROTECTION DISTRICT LAWS

Of the more than 2,780 special districts in California, organized under 135 current authorizations, fire protection districts as a group comprise the largest number, according to the 1955-56 Annual Report on Special Districts published by the State Controller. All districts were placed in one of the 65 categories according to function, and the fire protection group contained 450 districts compared to the next largest group, highway lighting districts, of which there were 411, and the third largest group, cemetery districts, of which there were 237.

Fire districts may be formed under four principal authorizations: (1) local fire districts (HS 14001-14306); (2) county fire protection districts (HS 14400-14598.5); (3) metropolitan fire protection districts (HS 14325-14375); and (4) fire protection districts in one or more counties (HS 14600-14766).

The committee's study revealed that two of the four fire district acts would not need to be considered to any great extent in the consolidation of laws effort. One of these, the Metropolitan Fire Protection District Act, is not presently being used, as far as the committee can determine. In fact, it is not as modern as its name implies and seems to be limited to watershed fire protection. Several witnesses therefore recommended its outright repeal.

Another act, fire protection districts in one or more counties, was felt to be undesirable by several of those testifying and has seen rather limited use. In fact, only 45 of the State's approximately 425 fire districts are organized under this law. Mr. William M. Siegel, legal counsel for the County Supervisors' Association of California, was one of those recommending the repeal of this act. Mr. Siegel stated that there is now a simple procedure whereby the existing districts under this act could reorganize under the newly rewritten Local Fire District Act, which also provides for an independently elected governing board. Witnesses representing several districts of this type felt that they were satisfied with their present authorization but were not opposed to reorganization under a consolidated act as long as such act is flexible enough to assure a continued successful operation of their district.

It would therefore seem that the principal task facing the committee centers around the feasibility of combining the two most used fire district laws, the Local Fire District Act and the County Fire Protection District Act. The committee's inquiry into the possibility of reducing fire district acts seemed to be well received by nearly all witnesses testifying at the hearing, but many suggested that it would be necessary to retain both of the principal acts.

GOVERNING BODY

The basic reason for the strongly urged retention of both acts was a desire to have the two different types of governing bodies retained. Chief Joe Yockers, Fire Marshal for the State of California, brought this point out in his testimony:

> " * * * I believe there is good and sufficient reason for maintaining both types of administration of fire districts. In an area such as Los Angeles County where it is becoming rapidly built up and congested, where there are a great many fire districts whose boundaries are contiguous, or very close together, where conditions are similar, there is every argument in the world in favor of having the kind of administrative setup that they have here in Los Angeles County in allowing them to consolidate and allowing them to be under one administrative government, which here is the county board of supervisors. I think that any change in California law that would not provide for that would be wrong.
>
> "By the same token, we must consider that in the more outlying areas, those counties that are more sparsely populated, that smaller districts are formed to take care of small communities that grow up in farming and rural areas, and in most cases the fire department, to a measurable degree, is a volunteer fire department and they have an entirely different problem. * * *
>
> "The districts that are organized under a fire commission elected by the people of the district itself, where they are close to them, where they can work closely with them, I would strongly recommend. If there is a consolidation of the fire district acts, consideration should be given both types of government in those districts. * * * "

Witnesses representing the two types of districts revealed that the choice of governing body was the most important issue involved. Mr. Edward Parkhill, Fire Commissioner, Lafayette Fire District, typified the feeling among representatives of local fire districts:

> " * * * I do know the people of Lafayette would like to elect their own fire commissions, whether they are in a consolidated district or whatever type they are in. It gives them a little more feeling of control and representation, which in a local unincorporated area such as ours they only have through the school board and fire commission."

Representatives from county fire districts, as well as county government, were just as adamant for the retention of the board of supervisors as the governing body of this type of district. This was reflected in the testimony of Oran L. Slaght, Chairman of the Santa Clara County Board of Supervisors:

> " * * * the board prefers the County Fire Protection District Act and would oppose any efforts to deprive the board of jurisdiction in fire protection matters, either through repeal or drastic amendment of this act. This opinion is not arbitrary. It has been reached only after careful consideration and is based in part on the following reasons:

"1. Fire protection is a countywide problem and a responsibility which should be in the hands of the supervisors. Local fire districts in Santa Clara County have done a magnificent job, and the above is not to be considered a criticism of their past record. However, the rapid growth of our county calls for countywide planning if we are to continue to render adequate and efficient service. Although many areas do not now require protection from a county district, countywide planning, plus the flexibility of the County Fire Protection District Act, will permit the extension of fire protection services to new areas quickly and efficiently as the need therefor arises.

"2. Integration of many procedural matters with county functions establishes uniformity and economy. A county fire protection district must follow county budgetary procedures. This affords the taxpayers of the county an opportunity to appear at a well defined place at a well publicized time to attend district, as well as county budget hearings. County civil service rights and procedures may also be extended to county fire protection districts at a minimum cost and inconvenience.

"3. Local control is preserved. The effectiveness of local control is not to be measured by the size of a district but by the availability of a district governing board to its voters and the time and attention such board can devote to district problems. Modern transportation and communication facilities make the county seat readily accessible to all parts of the county and the county supervisors readily available (by telephone and personal contact) to all the county residents, more so perhaps than in many smaller districts whose meeting places and board memberships are unknown to the average taxpayer. Furthermore, membership on the board of supervisors is more and more becoming a full-time job. Generally speaking, despite the demands of our general county duties, we can and do devote more time to the business of special district government than do many part-time officers of small districts."

Mr. James M. Parmelee, Deputy District Attorney, San Mateo County, pointed out that the problem of flexibility of representatives would be resolved under a consolidating act if the committee followed the same procedure for fire districts as it did for park and recreation districts in 1957:

" * * * the board of supervisors is in favor of uniform legislation simplifying district procedures rather than having several district acts, each one designed for a particular sphere and the board of supervisors would be in favor of either merely the two fire district laws or perhaps even one fire district law which is of sufficiently general application so that it can be used for all the districts.

"In that connection, I understand from the discussion this morning that apparently most of the objection to, for example, the Local Fire District Law alone without the County Fire Protection District Law is that the board of supervisors would not be the governing body. It seems to me that in line with the procedure which was authorized in the Recreation District Act of 1957, suffi-

cient provisions could be put in so that your petition for formation could specify the type of government desired, or in the alternative, that the board of supervisors would be given authority to initiate the proceedings and specify the type of government it is desired to have for the district. Of course this would be with the right of a hearing so that interested persons could appear, and an election on the question of forming the particular district would be required."

Besides the above two forms, as provided in the County Fire District Act and the Local Fire District Act, a third alternative would probably be desirable to provide for city representation of cities which are included within the district. This suggestion was made by Lewis Keller, Associated Counsel, League of California Cities, who testified as follows:

"Again it is the policy of our organization that districts serving a city or cities on a more or less permanent basis should have provisions for direct city representation on the governing body. In other words, when a city is going to delegate to another governmental agency the performance of a municipal function, it would appear to be very desirable public policy if that city had some direct representation on the governing body of the agency to which it delegated the power of providing the service.

"Typical of that type of governing body is the Bay Area Metropolitan Rapid Transit District and the Bay Area Air Pollution Control District. The regional planning legislation of the 1957 Session for the Metropolitan Water District is one of the earliest. There are many district acts on the books now that provide for direct city representation on governing bodies."

This type of alternative was also offered in the park district consolidating legislation. Another differing method of providing for municipal representation will be discussed in Part V of this report on the proposal submitted to the committee for a "Metropolitan Fire Authority."

ADMINISTRATIVE FLEXIBILITY

The second major concern of those testifying was in regard to a desire to retain the flexibility of the County Fire Districts Act if a consolidating act is adopted. This fact was brought out by Spencer Williams, County Counsel, Santa Clara County:

"We favor the two acts, but if there is a consolidation into a single act, we believe that many of the features of the County Fire Protection District Act should be included in the single act.

"Speaking from a lawyer's point of view, I believe that the County Fire Protection District Act is much more flexible than the Local Fire District Act in the extension of services to new areas and in the whole of precedure. For instance, annexations to a county fire protection district may be initiated by the board of supervisors when they realize that the area is in need of fire protection. Under the Local Fire District Act it must be initiated by petition from the area. In our county, where there are large subdivisions going in in great numbers, I think the flexibility of the

County Fire Protection District Act permits the extension of services in a more efficient manner."

It would therefore seem desirable to include provisions in the consolidated act whereby such procedures as district formation, annexation, consolidation, etc., could continue to be effected by the board of supervisors if the district were organized under the alternative providing for the governing body to be the board of supervisors. In this way the operation of the existing county fire protection districts would not be changed.

CONSOLIDATION OF FIRE DISTRICTS

Throughout the hearings a number of witnesses proposed that something be done in regard to providing county government with the power to effect reorganization of fire districts where study indicated this was desirable. In that regard, William Siegel of the County Supervisors' Association, spoke of the difficulty of trying to bring about reorganization or consolidation where there is more than one type of fire district involved. He informed the committee that it is possible to consolidate county fire protection districts, and there is a provision in the new Local Fire District Act to consolidate a county fire district with a local fire district, but there is no provision in the present law for the reverse procedure so that a local fire dstrict could be placed under county operation. Mr. Siegel then made the following suggestion:

> "I suggest first that the board of supervisors should have the authority to on its own motion initiate the adoption of a notice of intention to consolidate a local fire protection district with a county fire protection district. The board should then, after notice, hold a public hearing, and if the board then decides to proceed, it should in some way send a resolution of the adoption of its motion to the governing board of the local fire protection district.
>
> "Now if the local fire protection district governing board accepts the consolidation, I don't believe we should be forced to go to an election. If they refuse the consolidation, I believe then the board of supervisors should have the power to call an election in the local fire protection district on the question of merger. This would provide an opportunity to get this matter before the people."

The County Counsel of Santa Clara County was in agreement with this line of reasoning, as shown in the following excerpt of testimony in which Chairman Bradley questioned Mr. Williams about this problem:

> **Bradley**: May I ask you a question right here? Do you feel that the existing law in the matter of consolidation of fire districts is adequate, or do you think there could be any changes made to facilitate on an optional basis, or a volunteer basis, the possible consolidation of districts?
>
> **Williams**: I think they could be improved, Mr. Chairman. As Mr. Slaght stated, you can consolidate all of the local fire district acts in one step or you can consolidate the county fire protection district acts with a local fire district in one step. That was the

subject of a recent Attorney General's opinion. However, there is no way to consolidate a local fire district with a county fire protection district in one step. They require the dissolution first; then the annexation of the territory.

"I heard Mr. Siegel this morning make a proposal which I think is an excellent one and that would allow the board of supervisors to initiate the consolidation of a local fire district into a county fire protection district act. Then have the hearings, refer it to the local fire district board, and if necessary, call an election of the district so that the voters can determine the question of consolidation. I think that is a very excellent and workable method which would enhance in our county our steps to consolidate."

Under a consolidated act, following this line of reasoning, a provision for consolidation would merely provide a method whereby the alternate form of governing body could be changed from that of a locally elected board to the county board of supervisors.

TAX ZONES

Another problem presented to the committee for its consideration was in regard to the need for a fire district authorization to establish a separate tax zone within a municipality. The Los Angeles County Fire Department which serves 16 cities through one of its districts has had a difficult situation to cope with in that several of these cities have an assessed valuation which is above normal, and one especially desired a lower level of fire protection. Since the present County Fire Protection District Act provides a zone may be established for cities desiring a higher level of fire protection, it was felt that the reverse should be available also so that a lesser tax rate may be established for cities under the above indicated circumstances.

Chief Lathon Brewer, under questioning by Chairman Bradley, explained his request for either a separate tax district or tax zone provision:

Bradley: Do I correctly interpret the statement that you made earlier that through the establishment of zones, some of this problem might be alleviated? That is, the problem of encouraging newly incorporated cities not to withdraw from the district?

Brewer: That was one of the thoughts that we had. Some of them have indicated that they would perhaps like to have a separate district for the city and still remain in our fire protection setup. They like the additional coverage that they get through remaining in the county fire protection district, but some of them feel that due to the compactness of their city, if they were a separate district and still participating in the overall program, they could maintain their share of equipment and manpower at a lower rate than the overall rate. They would thereby still remain under county management and participate in the overall program, but might have a lower rate.

Now this could be accomplished in two ways. One way would be to have a district established for the incorporated city, or another concept would be to establish a separate fire protection zone for a

city. For example, if the consolidated basic rate was 50 cents, but based on valuation factors within a particular city and their level of service, their rate could be say only 40 cents, based on the zone or district—separate district—concept.

We think we are going to need something like this as more and more areas incorporate; we are going to need zones or provisions whereby these separate cities can form a district of their own and remain part of the county fire protection setup. Some of them have told us that they like the idea of the county operating the fire department. They have no problems of personnel turnover, retirement, resignations, and that sort of thing. They could leave all of this to the county and at the same time they would get the benefit of the experienced men that the county already has, and the organization that they have, whereby they can call in equipment from all over the county to assist them in the event of a major disaster or a serious fire. We think that something should be done to permit them to continue in our operation and still have some local control over their budget. That is one of the main things they are interested in.

Bradley: Then the tax rate in the zone, let's say, would be related to the level of service—the amount of service that they are getting.

Brewer: That's right.

It would seem that the suggestion to allow districts to establish separate municipal tax zones so that municipalities can set the level of service they desire and pay accordingly would be a desirable provision. In this way it is felt that municipal participation in areawide fire protection would be encouraged.

SUGGESTED PROCEDURE FOR FIRE DISTRICT ACT CONSOLIDATION

The State Fire Marshal, Chief Joe Yockers, felt that the Local Fire District Act could become the new consolidated act if one were drafted by merely amending it to provide for the necessary flexibility. Assemblyman Biddick brought out this fact in the questioning of Chief Yockers:

Biddick: I assume that your suggestion of going about consolidation of the district laws by the committee is quite sound, but I was wondering again whether the basic legislation now exists in this 1881 act by which amendment would be the act that essentially would provide the consolidated act. It is going to involve junking everything and starting all over, or has there been enough work done now that you could use this 1881 act as a framework for the new consolidated act?

Yockers: I am of the opinion that the 1881 Act would provide a good framework and is one which might, with the least amount of amending, be made acceptable to all persons concerned, for this reason. In the beginning we took all of the fire district acts and made up comparisons of them as to how they did these various things and then tried to take the best out of all the acts and put them into this one act.

Secondly, we referred to standard methods of giving due notice, standard methods of conducting elections, standard methods for reporting taxation, and things of that kind, which would simplify the matter so far as the counties and districts were concerned in their organization. There seems no justifiable reason for having a different way of holding an election in a fire district than you would have an election in the city or county. So we referred to the standard election laws. By the same token, as I stated in my report, we referred to the uniform district organization act in a great many cases. For those reasons I am of the opinion that with perhaps some minor amendments in the operational procedure and then by adding perhaps a new article on administration by the county board of supervisors that you would accomplish much the same thing.

It would seem that basically the two principal acts could be combined by using this approach. Perhaps some of the procedural provisions would have to be changed within the Local Fire District Act; however, since it is felt desirable to continue with those procedural provisions included in the consolidated Park, Recreation, and Parkway District Act in an effort to obtain uniform provisions for all types of district law.

The consolidation of fire district acts would seem to present no insurmountable obstacles. The evidence presented to the committee would indicate the importance, however, of retaining both of the present basic forms of fire district governing body—the locally elected board and the board of supervisors—through an alternative process which would be chosen at the time of the formation proceedings.

PART III

CONSOLIDATION OF SEWER DISTRICT LAWS

Sewer district acts create a far greater problem than fire district acts in regard to their consolidation, primarily due to the large number and their varied purposes.

PRESENT AUTHORIZATIONS

There are nine single-purpose district acts pertaining to the function of sewage collection and disposal: (1) Sanitary Districts (Acts of 1923) (HS 6400-6917); (2) County Sanitation Districts (HS 4700-4859); (3) Municipal Sewer Districts (Act of 1911) (HS 4600-4639); (4) Sewer Maintenance District Act (HS 4860-4926); (5) Municipal Sewer District of 1939 (Deering-1939, 24:37; D.A. 5192a); (6) Sewer Districts in Unincorporated Territory (HS 4659-4667); (7) County Sewage and Water Districts (HS 5500-5656); (8) Joint Municipal Sewage Disposal District (HS 5700-5720.15); and (9) Regional Sewage Disposal District Act (HS 5900, et seq.). As far as could be determined, the latter three district acts are not at present being used by any district in the State, and two other acts—the Municipal Sewer Districts of 1939 and the Sewer Districts in Unincorporated Territory Act—are used by only a few districts.

It should be noted that the above single-purpose sewer district acts are not the only acts which authorize sewage collection and disposal. There are five multipurpose district acts which include sewage disposal as one of the authorized functions: (1) The Community Services District; (2) California Resort District Act; (3) County Water District Law; (4) Public Utility District Act; and (5) The Municipal Utility District Act.

In addition, there are provisions for the maintenance of sewers included in both the "county (sewer) maintenance district" section under the Improvement Act of 1911 and the "county maintenance districts" under the provisions of the Municipal Improvement Act of 1913. The function of these two sections is to provide primarily for a method whereby the cost of maintaining sewers can be levied upon an area which has existing sewers. They amount to little more than an authorization for a tax zone area in which sewers may be maintained by the county.

The committee has determined that at this time only the nine single-purpose district acts and possibly the sewer maintenance district provisions would be considered in the present consolidation of laws study.

REPEAL OF LITTLE-USED LAWS

As previously pointed out, five of the nine single-purpose district acts are either not at present being used or are being used by only three or four districts in the State. Most of the witnesses recommended the repeal of these acts.

Prior to the hearing several districts organized under the two little-used laws were contacted to see if they could continue their present operation if reorganized under either the Sanitary District Act or the County Sanitation District Act. Affirmative answers were received from those districts contacted. Therefore it would seem that repeal of these particular acts would be advantageous and would create no particular problem.

SANITARY DISTRICT ACT

The majority of the witnesses at the hearings represented the California Sanitary District Association and the various individual sanitary districts throughout the State. There are approximately 127 sanitary districts in California. Testimony indicated strong concern that the Sanitary District Act of 1923 be left as is. John A. Nejedly, General Counsel, California Sanitary District Association, testified that it was their association's belief that there is a basic philosophical difference between the Sanitation District Act and the Sanitary District Act. It was felt that the proposed alternatives would simply include each act in its entirety if these two acts were to be combined.

Chairman Bradley in questioning Mr. Nejedly, brought out the differences between these particular acts:

Bradley: Now I'm going to ask for the general edification of the committee, and to have it in the record, will you outline basically the differences between the Sanitation Act and the Sanitary District Act.

Nejedly: Well, first, they differ principally in their basic approach to the problem. One of them uses an existing public agency, the board of supervisors administers the control, hires the personnel, and takes care of the taxes, taxing only that area which is benefited ostensibly by the particular improvement or the expenses of the administration of it.

In the second case, the 1923 act, the people of the district form, in a sense, an autonomous district with its own board of directors directly controlled by the people within that district, and that board of directors, responsive to the people, is the board that develops the system, hires the employees, takes care of the development of an administrative system necessary to provide for the service, which in this case is the collection of human and industrial waste. The basic difference is that you are going to use an existing public agency or do you create a new one? Both alternatives are desirable. In some cases a county sanitation district is the best answer to the problem and in other cases the creation of an independent district may be needed to solve the problem.

We feel that in a number of cases, for example, the board of supervisors doesn't want the responsibility of developing a sanitary system for a local area. We find in a number of cases that people in a local area want to develop their own regulations; they want to develop their own planning; they want to develop their own local control because they feel that because of their own responsiveness to that local problem they will be better able to determine what the answer should be, rather than to act through

a board of supervisors which may be far removed from the local problem and not responsible to the people themselves. I think these indicate what, in answer to your question, those differences are.

Of course, the basic difference between the Sanitary District Act and the Sanitation District Act is the provision for a separately elected sanitary district governing body. However, two other major differences are the tax rate limitation and the power to assess which are provisions in the Sanitary District Act. These provisions were discussed by Assemblyman Winton and Mr. Nejedly in the following excerpts of testimony:

Winton: Let me ask this. Actually, you are under the 1923 act; the district has the power to do its own assessing.

Nejedly: It has that power.

Winton: Do you have any ideas, any knowledge of how many districts are doing their own assessing?

Nejedly: The best answer I can give you is from a limited experience and I would say about a third of them are doing it. They are doing it for this reason; any time, as the committee knows, that you establish a statewide limitation, you don't take into consideration local problems, and at the present time the tax limitation of the 1923 act districts is 60 cents. In one district that may be a workable limitation; in another district it may not. We note, for example, in Weaverville where they had a very serious sewage problem the tax limitation would not provide, by using the county tax roll, for the development of any sewage system. So the local board developed through its own assessment procedure an evaluation of about three times that of the county roll and they were therefore able to in effect get a $1.80 tax rate.

Winton: Of course, my natural query then is what good is the tax limitation if that's permissible?

Nejedly: It's permissible, but I think the control lies in the fact that it is still operated by a local elective body. This is very serious; you may think it's humorous but actually it's serious. Three members who are present today, for example, are here as a result of recalls. The local control is an effective control over that type of a result. I don't think the local people would stand for it unless in the case, for example of Weaverville, they were educated to the fact there was no other way to solve the problem.

A number of witneses representing various sanitary districts throughout the State concurred in the views of their association representatives. In essence, witnesses generally believed that the Sanitary District Act serves a separate and distinct purpose and would be difficult to merge with the other acts.

COUNTY SANITATION DISTRICT ACT

County sanitation districts are also quite extensively used for sewage collection and disposal. There are a total of 104 said districts in California. Testimony revealed that county sanitation districts are providing areawide sewage disposal in many counties. For example, in Los Angeles County there are 19 sanitation districts operated by a single joint administration—one chief engineer, one counsel, one office staff,

and one office provides the administrative service for all 19 districts. There are no sanitary districts in Los Angeles County. The 16 sanitation districts in San Diego County operate in a similar manner, and there is only one sanitary district in this county.

There is a slightly different operation of sanitation districts in Orange County. Mr. C. Arthur Nisson, Jr., General Counsel for those districts, explained their operating methods:

> " * * * I merely want to point out that the sanitation districts in Orange County possibly are a combination of the operation in Los Angeles and San Diego, with the tendency to be that the sanitation districts in Orange County serve substantially all of the county. There are a few exceptions on the extreme south end of the county at San Clemente and Laguna, and again at Seal Beach, but outside of that, all of Orange County which is sewered through the county sanitation districts acting jointly. In this operation they have one organization, as has Los Angeles, one office, and they have what they call a joint treatment and disposal facility which consists of two treatment plants and one outfall sewer. The individual districts own, or are in the process of acquiring, the main trunk lines within their own territory, and they come to this joint facility where they operate together."
>
> " * * * The local collection is done by the cities principally and by several of the remaining sanitary districts. In the last four or five years we have had three sanitary districts become inactive by being taken over by the cities which they principally served, and in each case this was done by a vote. Those are the sanitary districts of Buena Park, La Habra, and Placentia. The Garden Grove Sanitary District is the principal sanitary district remaining in the county, and perhaps the next is Midway City, and there may be one other, Costa Mesa, which is quite active. Three of those are the principal sanitary districts and they are in charge of local collection which feeds into the main trunk lines. In that operation we usually term the sanitation district the wholesaler and the sanitary district the retailer in our accounting."

Thus it would seem that several of the larger metropolitan counties are using the sanitation district device to provide for almost complete areawide sewage collection and disposal. Generally speaking, sanitary districts are used to provide sewage facilities in outlying areas, while the sanitation districts are used in the more populated areas to provide more widespread service.

One of the distinguishing features of the Sanitation District Act is the composition of the governing body. Mr. Joseph Gill, General Counsel, Los Angeles County Sanitation Districts, explained the method of selecting members to the governing body of a sanitary district:

> "The Sanitation District Act, Section 4730, makes the board of directors automatically consist of the entire membership of the board of supervisors if the county sanitation district consists entirely of unincorporated territory. In Los Angeles County we have two such districts: District 14 which is in the Lancaster area, and District 20 which is in the Palmdale area. Both of those districts are entirely unincorporated; the board of supervisors is the gov-

erning body of both districts. We have in that section the provision that any sanitation district located entirely within a city shall be composed of the city council of that city; and we have one such district. * * * "

"Then the rest of the districts are made up of a combination of city council and the chairman of the board of supervisors. A typical example is District 2 which has, I believe, 12 or 13 directors. The chairman of the board of directors of District 1 and 2, and all of the other districts except 16, is Mr. Burton W. Chace, Chairman of the Board of Supervisors, by virtue of his occupancy of that position. The other members of the board of directors consist of the mayors of each city, all or a portion of which is in the district. So, the average sanitation district in Los Angeles County is composed of a group of mayors, usually from 5 to 10, plus the chairman of the board of supervisors."

In this way sanitation districts take on the appearance of a metropolitan district, such as the Metropolitan Water District, Bay Area Air Pollution Control District, etc.

Most of the witnesses representing sanitation districts felt that their act should remain intact and not be consolidated with other sewer district acts. The reason often given was that the present financing stability of the sanitation districts might be jeopardized by a consolidation of acts. Mr. Gill made the following statement in this regard:

"The other reason I would personally subscribe to leaving the sanitation districts act intact is the financing feature. I have talked to bond counsel concerning the proposed consolidation, and I am led to believe from conversations that this proposition of consolidation has come up in the past; bond counsel is of the opinion, I believe, that it might cause some problems, financially speaking. The county sanitation districts over the years have built up a reputation; I don't believe they have had any adverse experience. County sanitation districts today have, I think, approximately $25,000,000 of outstanding bonded indebtedness; they have had rather good experience, as municipal financing goes, with their interest. In the New York bond market the county sanitation district bond issue is well known, and bond counsel knows what they are writing and has a set procedure that has been built up over the years since 1924. I believe that any consolidation of several acts into one might disturb the stability of district finance."

In agreement with this belief was Mr. Nisson who testified that the Orange County districts had $23,000,000 worth of bonds to sell and they were most interested in maintaining a reasonable market; it was felt that if too much change was made in the act—by consolidation—they might have to start all over again which would be rather expensive for the people concerned.

Chairman Bradley questioned Mr. A. M. Rawn, Chief Engineer and General Manager of the Los Angeles County Sanitation Districts with respect to the consolidation of acts effect on bonding:

Bradley: What would be your opinion, gentlemen, if it were possible to incorporate the Sanitary District Act of 1923 into the County Sanitation Districts Act? Would that have any effect on your previous statement in regard to the name of the act and the possible interference with the issuance of bonds, in your opinion?

Rawn: Yes, sir, I would be opposed to that for the reason that the Sanitary Districts Act is not meant to apply to regional sewerage in the same manner that the Sanitation District Act is. Its governing board is differently selected, they have their own assessor, they have a tax limitation which is changed, or can be altered, by the county or by the district assessor. The basic philosophies of the two acts are not the same.

In essence, it would seem that witnesses generally agreed that the County Sanitation District Act should remain unchanged. It was indicated in the testimony that the Sanitation District Act was framed to deal with metropolitan sewage, while the Sanitary District Act basically solves the sewage collection and disposal problems of local areas; each of these acts seem to serve an important and somewhat different purpose. Also, the merging of these two acts would appear to be somewhat difficult.

MUNICIPAL SEWER DISTRICTS

Two acts, the Municipal Sewer Districts (Act of 1911) and the Municipal Sewer Districts of 1939, are restricted to operation within incorporated territory only. An incomplete committee survey of municipalities revealed that the Act of 1911 is used by over 270 districts, while the 1939 act has been used only four times. It was learned that the 1939 act was adopted principally to take care of a specific problem, the acquisition of joint rights in sewerage systems of other public agencies. At the time this provision was not in the 1911 act; however, in 1949 this provision was amended into it, thereby explaining the limited use of the 1939 act.

It would seem that the important provisions of these acts could be amended into the Sanitation District Act or the Sanitary District Act, or the two municipal acts could be combined thereby eliminating one act.

SEWER MAINTENANCE DISTRICTS

It is possible to provide sewer maintenance functions under the three different authorizations: (1) the Sewer Maintenance District Act, (2) "county maintenance districts" authorized in the Improvement Act of 1911 (Streets and Highways Code), and (3) the maintenance provisions of the Municipal Improvement Act of 1913 (Streets and Highways Code).

The function of a maintenance district is primarily to provide a tax area whereby existing sewer facilities may be operated by the county or city in which the facilities are located. Sewers are often required in new home subdivisions, and therefore the facilities are built by the subdivider, but no method of operating and maintaining them is provided for. By the application of one of these maintenance district acts, a tax area is created enabling the supervisors, for example, to use ex-

isting county equipment for the operation and maintenance of such facilities.

Several witnesses suggested that the various maintenance districts could be consolidated into a single act, or placed into the Sanitation District Act. Mr. Jean L. Vincenz, Director of Public Works, San Diego County, felt that the following arrangement would be workable:

> " * * * Contrary to the setup of Los Angeles County sanitation districts, we have several sanitation districts that are completely collecting systems, and from that standpoint, they would serve what Mr. Gill was describing to you as these 1911 acts. Those are definitely sanitation districts; they don't have their own sewage disposal plant, and we contract with another agency for the disposal of the sewage. So from that standpoint I can see no reason why, if you wanted to, there couldn't be arrangements worked out for sewer maintenance districts to become sanitation districts; or, in those cases where that would be illogical, for sewer maintenance districts to contract with the sanitation districts, or vice versa."

Mr. Eugene Sturgis, Counsel, Stege Sanitary District, also felt that some consolidation would be possible in regard to maintenance districts. Mr. Sturgis suggested that "there is a possibility, with careful study, of merging the sewer maintenance district procedures."

Similar suggestions were made by James Parmelee, Deputy District Attorney of San Mateo County:

> " * * * It would appear to our board that first of all it would be easily feasible to consolidate the Sewer Maintenance District Act under the Health and Safety Code with the one under the Streets and Highways Code. There wouldn't seem to be any problem in working out a statute which would cover both; they seem practically to parallel each other.
>
> "It was also the thought of our board that perhaps the county sanitation district could, in conjunction with the Sewer Maintenance District Act, be combined into one act which would carry the best features of both in order that such districts would have equal authority—the districts which are presently sewer maintenance districts would have more authority, particularly in regard to general obligations bonds. A sewer maintenance district does not have the authority to float those at the present time and we have found that in our county particularly the sewer maintenance district is unable to cope with the problems of installing new sewage treatment plants as they are needed. It may be that in some counties they would be opposed to the consolidation of the County Sanitation District Act and the Sewer Maintenance District Act for the reason that the board of supervisors is the governing body of the Sewer Maintenance District Act, whereas the County Sanitation District Act provides for a different governing body in different situations; but the answer to that may be provided in the law to make it permissive for the board of supervisors to be the governing body even though incorporated

territory and sanitary districts were included if the local agency affected so designated the board by resolution. * * *"

The majority of the witnesses seemed to agree, therefore, that to consolidate these three authorizations would be feasible. Perhaps more desirable would be the incorporation of a combined sewer maintenance section, with specific provisions as to formation, etc., into the County Sanitation District Act. In this way, the desired standardization of procedures would be reduced by three, thus eliminating a great deal of the confusion surrounding district authorizations pertaining to this function.

OTHER SEWER DISTRICT ACTS

The committee believed that future study would have to be given to the other acts which are authorized to perform the function of sewage collection and disposal. Due to the complexity of the multipurpose district acts, it was felt that only the above mentioned districts should be included in the present study. A number of questions and recommendations were made regarding the County Water District Act and the Community Services District Act, however, this would seem to be a separate problem deserving of special alteration by the committee at a later date.

FINDINGS

Following the recommendations of witnesses at the hearings, in conjunction with research on the subject, it would seem that the following assumptions could be made:

(1) It is desirable to retain the existing County Sanitation District Act and the Sanitary District Act of 1923.

(2) An investigation should be made by the Legislative Counsel to determine if it is mechanically possible to consolidate the major provisions of the three maintenance district acts and amend the consolidated provisions into the County Sanitation District Act as a separate section.

(3) Consolidate those provisions of the 1939 Municipal Sewer District Act necessary for continued operation of districts formed under this authorization into the 1911 Act, incorporate such provisions into the County Sanitation District Act.

(4) Repeal the Regional Sewage Disposal District Act, the Joint Municipal Sewage Disposal District Act, the Sewer Districts in Unincorporated Territory Act, the County Sewerage and Water Districts Act, and the Municipal Sewer Districts of 1939 Act.

PART IV

COMMUNITY SERVICES DISTRICTS

The Municipal and County Government Committee decided that it would investigate the use and success of the Community Services District Act due to its newness of enactment as well as in concept.

The Community Services District Act (Government Code 60000-60891) is a multipurpose act designed as a method to provide the following services to a community:

(1) Water for domestic, irrigation, sanitation, and fire uses;
(2) Sewage, waste and storm water collection, treatment, or disposal;
(3) Garbage or refuse collection and disposal;
(4) Fire protection;
(5) Public parks and recreation;
(6) Street lighting;
(7) Mosquito abatement;
(8) Police protection;
(9) Acquire sites for, construct, and maintain library buildings, and co-operate with other governmental agencies for library service.

Services desired to be performed by a particular district must be specified in the initiation petition. Therefore, a number of community services districts are authorized to perform only one or two functions. Even many of those districts authorized to perform all of the above services have undertaken to perform only a limited number of functions.

It would seem that the community services district concept works best in a rural type area. Through the independently elected board of directors composed of three members, the community services district can, under certain circumstances, provide an unincorporated area with needed services much like a municipality. In urban areas this type of district would perhaps be of limited value since few such areas are without one or more single-purpose special districts which are performing a number of the authorized functions. Most of the community services districts which have been established in urban areas have themselves turned out to be nothing more than a single-purpose district.

One of the problems associated with this type of district, as presented to the committee at the hearings, was in relation to the services which the district is authorized to perform. As previously stated, a particular district can perform only those services which the voters have authorized it to perform, as stated in the formation initiation procedure. Some of the districts which were established to provide, for example, only the water supply function, now find that areas within the district have rapidly urbanized and are desirous of the usual municipal type services. However, new services may be performed by a district only through a districtwide vote. The act provides for a method of furnishing additional services to a portion of the district by means of the

improvement district device. However, it is difficult to get a favorable districtwide vote to assume a new function, such as street lighting or fire protection, when large amounts of agricultural lands are involved and the area needing the expanded service is small.

Since a community services district, when used correctly, eliminates the need for numerous single-purpose districts under individual governing boards, it would seem desirable to provide that a district established under this act may perform any or all of the stipulated functions on resolution of the governing board.

The use of this act has expanded considerably during the past few years. At present there are over 50 community services districts in the State of California. It would seem desirable for the committee to again take a look at the feasibility and success of this act some time in the not too distant future.

PART V

REORGANIZATION OF SPECIAL DISTRICTS

A number of witnesses supplemented their testimony on the committee's hearing on modernization of noncharter county law with a discussion of the problems facing county government in regard to the independent special district. It was stressed that the multiplicity of special districts is the greatest factor in county government's difficulty in trying to solve urban and metropolitan problems.

The principal disturbing factor to county government officials does not seem to be the large number per se, but that the vast majority of special districts are governed by an independently elected local board over which they have no authority or control. Of the special districts, about 1,690 are independently governed and 1,100 are governed by the board of supervisors or their appointees.

Since so many are separate political entities, often being interspersed with the county governed districts, county government often can find no way to effect reorganizations through consolidation or administrative centralization. Most of the independent special districts believe they are doing a good job and resent any intrusion on their local autonomy. The fact is that many of these districts are doing a good job, all things taken into consideration, but nevertheless the function could perhaps be performed much more economically and efficiently on a wider basis by a single administration to take advantage of large scale operation and a reduction of administrative overhead.

Witnesses at the hearing testified that the board of supervisors is usually thought of by the public as being responsible for the proper functioning of special districts; therefore, they logically turn to county government.

It was pointed out by Mr. M. D. Tarshes, Sacramento County Executive, that county government is no longer just as extension of State Government at a local level, but that county government is in fact a municipal government in many areas without municipal powers.

Since the special district device is essentially the vehicle by which these services are provided to the unincorporated areas, it was felt that county government should have more authority over them. Mr. Tarshes testified as follows:

> "I would further suggest that there be no special districts in the unincorporated areas under independent governing boards; that these special districts be governed by the board of supervisors."

The district problem was also discussed by a representative from Contra Costa County. County Manager D. M. Teeter stated that he also believed the independent special districts should be converted to county management:

> "This would further centralize responsibility for standards of performance and minimize investment in capital equipment."

However, it was his opinion that the mere multiplicity of special districts is not bad, but that in fact they usually result from an effort to place the cost of services on the owners of property served.

In many areas districts which are governed by the board of supervisors have been more successfully operated by placing all districts pertaining to the same function under a single administration as a county department. In this way a specialized staff can administer each function uniformly throughout the county unincorporated area, with each district becoming essentially a separate tax area. But county government cannot do this with the independent special districts.

The election of a group of local citizens to operate a special district has been cited by many as the democratic approach, providing for a high degree of local autonomy. However, others are of the opinion that this does not always produce the desired "grass roots" control that it is presumed to since district government in an urban area tends to be confusing to the citizen. In order to be a conscientious citizen residents of some areas would have to keep up with the activities of as many as 10 or 12 governments. Poor district voting records indicate that the average citizen has little interest in the day-to-day activities of districts, probably due to the large number and their relatively small scale operation.

Another suggestion was made that each county be authorized to establish a county special district commission to determine proper boundaries, the need for the district's creation, abolition, and consolidation. Harry Morrison, Executive Director of the Contra Costa Taxpayers Association, felt that in this manner the existing districts could be studied and recommendations made for their reorganization on a more proper basis. This committee would be similar to the County Committee on School District Organization which was established in 1949 by the Legislature to reorganize and consolidate school districts to make them a more economical and effective unit of government.

The special district problem is a growing one with no apparent solution in many areas of the State under present conditions. The policy of the Municipal and County Government Committee of reviewing special district enabling acts, with the ultimate objective of consolidating each group of acts pertaining to a particular function, will eventually eliminate one of the major problems hindering effective consolidation of special districts.

However, even though each group of districts may eventually be established under not more than one or two acts, there still remains the major problem of how to initiate reorganization action on a continuing basis. A re-examination of special district law with regard to methods of coping with the inadequacies of this important aspect of local government will continue to be a major topic of study by this committee.

PART VI

PROPOSED METROPOLITAN FIRE AUTHORITY

A proposal calling for a completely new concept in metropolitan district authorization was submitted to the Committee at its hearing in Sacramento on September 4, 1958, entitled "The Metropolitan Fire Authority." This proposal, if enacted, would establish an authority in each county in California, although it would be inactive and exercise none of its powers until the board of supervisors in the county in which it is situated declared the need for such an authority to function. The boundaries of the authority would be coterminous with the boundaries of the county. However, the area that would become initially active under the authority would include only the unincorporated area of the county and those municipalities which are currently being served by a fire district.

This, in effect, would establish a centralized administration of the fire districts within a particular county. It was originally designed for Los Angeles County where over 16 cities are served by the Consolidated Fire Protection District. These cities under the County Fire District Act do not receive representation on the governing body since the board of supervisors are empowered under this act to govern the district. Since the Los Angeles County fire districts are operated somewhat like a metropolitan district, those proposing this act felt that a new concept should be developed providing the representation afforded by other metropolitan districts which have been recently formed, such as the Bay Area Air Pollution Control District, Metropolitan Water District, and the Metropolitan Transit Authority.

Under the authority it is relatively simple for additional cities to become part of the active authority since only a city council resolution is necessary,

The board of supervisors has the power to activate a metropolitan authority after a hearing if it is found "that maximum efficiency and co-ordination of the fire fighting services in the county require a greater degree of co-operation between cities and the county and a larger degree of co-ordination."

Perhaps the most important feature of the metropolitan fire authority is the composition of the governing body since the powers, functions, etc., are essentially those of a county fire protection district. The governing body differs sharply from a county fire district in that cities which are a part of the active authority have a direct voice in the affairs of the authority.

The governing board is composed of not more than 11 members, six selected by a city selection committee, and the five members of the board of supervisors. In counties with less than six cities, the governing board would be composed of the board of supervisors and a representative from each city included.

The city selection committee is composed of the mayor of each city within the active authority. The six city representatives on the authority governing board may be either a mayor or a councilman.

Of course the important feature of the plan is to provide cities served by a fire district with proper representation on the governing body of the agency serving them. However, there is one other major aspect of the proposal and that is that the fire authority would operate all of the fire districts within a particular county if activated by the board of supervisors.

Provision is also made in the proposal to authorize the authority to provide certain services to municipalities outside the active authority on a cost basis. For example, if an "outside" city desired standby fire service to supplement their second alarm response, they may subscribe to this service from the authority. Another example of such service is in the field of training. Many small cities cannot afford to train their firefighters since they do not have the finances to support the necessary training facilities and staff; however, the authority could make their training facilities and expert instructors available to these cities for just the cost of actual training.

The proposed fire authority seems to be a workable device in principle. Due to the consolidation of district laws study currently being conducted by the committee, however, it might be determined that similar provisions should be provided for in the consolidated act rather than establishing the new authority concept.

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HON. CARLOS BEE
Speaker pro Tempore

HON. WILLIAM A. MUNNELL
Majority Floor Leader

HON. JOSEPH C. SHELL
Minority Floor Leader

ARTHUR A. OHNIMUS
Chief Clerk

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LETTER OF TRANSMITTAL

HONORABLE RALPH M. BROWN
Speaker of the Assembly, and
Members of the Assembly

ASSEMBLY CHAMBER, SACRAMENTO

GENTLEMEN: Pursuant to House Resolution No. 214, 1957 General Session, the Assembly Interim Committee on Elections and Reapportionment herewith submits its report for the 1957-1959 interim period.

This report contains a discussion of the major topics studied by the committee, together with relevant information submitted to the committee.

The committee wishes to acknowledge with appreciation all those who aided in the prosecution of the committee's work during the interim period.

Respectfully submitted,

WM. S. GRANT, *Chairman*
PHILLIP BURTON, *Vice Chairman*

MONTIVEL A. BURKE
JOHN A. BUSTERUD
CHARLES EDWARD CHAPEL
CHARLES J. CONRAD
ROBERT W. CROWN
LOUIS FRANCIS
CHARLES MEYERS
WILLIAM A. MUNNELL
CARLEY V. PORTER
CASPAR W. WEINBERGER

By Mr. Grant:

House Resolution No. 214

Relating to constituting the Assembly Standing Committee on Elections and Reapportionment an interim committee

Resolved by the Assembly of the State of California, As follows:

1. The Assembly Standing Committee on Elections and Reapportionment of the 1957 Regular Session is hereby constituted an interim committee and is authorized and directed to ascertain, study and analyze all facts relating to elections, the election process, the initiative and referendum, the circulation of political petitions and the obtaining of signatures thereto, and qualifications thereof, the apportionment and reapportionment of the State into districts for election purposes, including the reapportionment of congressional districts, the conduct of elections and the challenge of voters, and the duties and functions of state and county central committees in connection with the election process, including but not limited to the operation, effect, administration, enforcement, and needed revision of any and all laws in any way bearing upon or related to the subject of this resolution, and to report thereon to the Assembly, including in the reports its recommendations for appropriate legislation.

2. The committee shall consist of the members of the Assembly Standing Committee on Elections and Reapportionment for the 1957 Regular Session. The chairman and vice chairman shall be the chairman and vice chairman of the standing committee. Vacancies occurring in the membership of the committee shall be filled by the appointing power.

3. The committee is authorized to act during this session of the Legislature, including any recess, and after final adjournment until the commencement of the 1959 Regular Session, with authority to file its final report not later than the fifth legislative day after the constitutional recess during such session.

4. The committee and its members shall have and exercise all the rights, duties and powers conferred upon investigating committees, and their members by the provisions of the Joint Rules of the Senate and Assembly and of the Standing Rules of the Assembly as they are adopted and amended from time to time at this session, which provisions are incorporated herein and made applicable to this committee and its members.

5. The committee has the following additional powers and duties:

(a) To contract with such other agencies, public or private, as it deems necessary for the rendition and affording of such services, facilities, studies and reports to the committee as will best assist it to carry out the purposes for which it is created.

(b) To co-operate with and secure the co-operation of county, city, city and county, and other local law enforcement agencies in investigating any matter within the scope of this resolution and to direct the sheriff of any county to serve subpoenas, orders and other process issued by the committee.

(c) To report its findings and recommendations to the Legislature and to the people from time to time and at any time, not later than herein provided.

(d) To do any and all other things necessary or convenient to enable it fully and adequately to exercise its powers, perform its duties, and accomplish the objects and purposes of this resolution.

6. The sum of four thousand dollars ($4,000) or so much thereof as may be necessary is hereby made available from the Contingent Fund of the Assembly for the expenses of the committee and its members and for any charges, expenses or claims it may incur under this resolution, to be paid from the said contingent fund and disbursed, after certification by the chairman of the committee, upon warants drawn by the State Controller upon the State Treasurer.

Resolution read, and ordered referred to the Committee on Rules.

SCOPE OF REPORT

The Assembly Interim Committee on Elections and Reapportionment, pursuant to House Resolution No. 214 as a part of its purpose as included in the above-mentioned resolution has studied the following matters:

1. Composition and organization of state central committees.
2. Proposed changes in election laws.
3. Elections and reapportionment planning in 1961.

RECOMMENDATIONS

1. In preparation for the reapportionment which will face the next session of the Legislature, we recommend that the Interim Committee on Elections and Reapportionment be given such staff as is necessary to survey and estimate the present population in each assembly district within such counties as Los Angeles, San Francisco, Alameda and San Diego.

2. This committee investigated and recommends legislation for electronic tabulation of votes, and recommends its adoption as quickly as equipment with the necessary accuracy and speed is available. At the present time its use is limited to Los Angeles County. Chapter 8, Division 8, of the Elections Code should be amended to permit such other counties as desire to use electronic tabulation of ballots.

3. If there is a necessity for continued study of the laws dealing with campaign contributions and expenditures, it is recommended this study be made by the Committee on Elections and Reapportionment.

COMMITTEE REPORT

MEETINGS

The Assembly Interim Committee on Elections and Reapportionment, acting under House Resolution No. 214 of the 1957 Assembly Regular Session, held three meetings during the 1957-58 interim period.

The purpose of these hearings was to provide an opportunity for representatives of political parties and the general public to make known their suggestions and problems concerning election laws and procedures in California.

An organizational meeting was held in Sacramento on September 19, 1957. At this meeting work for the interim period was outlined.

The second meeting was held in Sacramento on August 1, 1958, prior to the Republican State Central Committee Convention.

The third meeting was held in Sacramento on August 8, prior to the Democratic State Central Committee Convention.

The minutes of the three meetings follow.

September 19, 1957

The organizational meeting of the Assembly Interim Committee on Elections and Reapportionment was held September 19, 1957, in the State Capitol with the chairman, Assemblyman William S. Grant, presiding, and the following members were present: William S. Grant, Montivel A. Burke, Phillip Burton, John A. Busterud, Robert W. Crown, Charles J. Conrad, Louis Francis, Charles W. Meyers, William A. Munnell, Carley V. Porter, and Caspar W. Weinberger.

Mr. Busterud made the *motion* that the rules as set forth in document dated September 19, 1957, being the general rules of the committee as per attached copy, be adopted. The motion was seconded by Mr. Burke and carried unanimously.

Mr. Burke made the *motion* that the chairman be empowered to call and arrange for such meetings as is desired; to employ such personnel as is necessary to conduct any investigations; and to arrange for any secretarial assistance that may be necessary. The motion was seconded by Mr. Busterud and carried unanimously.

Mr. Grant stated that he was appointing no subcommittees at the present time and would call no meetings during the coming year unless they were absolutely necessary, with the possible exception of a meeting in San Francisco which had already been discussed with some of the members. He asked the members to advise him any time they felt a meeting should be arranged.

There being no further business, the *motion* to adjourn was made by Mr. Conrad and seconded by Mr. Busterud. The vote was unanimous in favor of the motion.

The meeting was adjourned at 10.35 a.m.

August 1, 1958

The second meeting was held August 1, 1958, in Room 2169, State Capitol, at 10:30 a.m., Chairman Wm. S. Grant presiding, and the following members were present: Burke, Burton, Busterud, Chapel, Conrad, Crown, Grant, and Munnell.

Legislative Counsel representatives were Robert G. Hinshaw and Charles W. Johnson.

Alphonzo E. Bell, State Chairman, Republican Party, was the first witness and recommended that Section 2791 of the Elections Code be amended by adding the 58 county central committee chairmen as delegates to the conventions of their respective parties. Section 2791 prescribes the composition of the state conventions of each political party. The nominees or holdover incumbents of each party are the delegates.

Mr. Bell stated he believes it is essential to broaden the base of party activity and include additional delegates in the state convention as this would also give the members of county central committees direct representation in the policy-making activities of the convention, and the added participation would be a healthy stimulus to the party activities in the various counties and would be advantageous to both political parties. He was of the opinion that this recommendation would raise an added question as to the right of the county chairmen to make appointments to the state central committee in the same manner as other delegates. In order to preserve the element of proportional representation, he felt that Section 2803 of the Elections Code should be amended to provide that county chairmen from the most populous counties might have slightly more appointments to the state central committee than those from less populous counties. He said he was not prepared to suggest just where the dividing lines might be, but suggested this committee and its staff would be in the best position to work out that particular problem.

Assemblyman Chapel questioned the effect Mr. Bell's proposal would have as some assemblymen represent more than one county, with one assemblyman representing as many as 10 counties, which would give one assembly district 10 chairmen with appointive powers.

Mr. Bell agreed that there should be proportional representation so the more populous areas would have more appointments. He suggested leaving it up to the committee to work out the proportion and that a committee should be set up to recommend the specific breakdown as to how many members should be appointed from each district.

Assemblyman Chapel commented that candidates do not pay enough attention to the state central committee. Mr. Bell replied that they are trying to strengthen the state central committee and the party organization of both parties throughout the State by tying the county committees in closer to the state committee; that to bring about better co-operation you must give county committees better representation on state central committees and the state committee should be the actual head of the party organization in the State.

Assemblyman Busterud suggested that a commission be established for the purpose of reviewing the election laws. This was objected to by Assemblymen Munnell and Burton.

Edward H. Gibbons, former candidate for Congress and resident of the Fifty-fifth Assembly District in Los Angeles, discussed the situa-

tion arising when a party does not have a nominee as prescribed in the code, where the nominee or incumbent is the delegate to the party convention. It has been established by procedure, according to Mr. Gibbons, that the chairman of most of the county committees would have the authority to appoint the delegate and he would in turn appoint three delegates. He felt is was contrary to republican government to have delegates appointed by someone out of the district. Mr. Gibbons stated that the law as interpreted to him provides that the delegate in the absence of a nominee or candidate or incumbent, must be appointed from the district, but it is vague as to the appointment of the three additional delegates. He believed all members of the state central committee should be legal voting members of the district they represent. He requested that the committee study this problem and bring in new legislation.

Assemblyman Busterud felt some flexibility in the powers of appointment should be retained. Assemblyman Conrad commented that Mr. Gibbons' proposal might mean 31 autonomous central committees in Los Angeles County, as an example, rather than one county central committee.

Assemblyman Conrad read the telephoned statement submitted by Ivan Hinderaker, Associate Professor of Political Science, U. C. L. A. The statement follows:

I. Although many states will not have to make plans for reapportionment of congressional and state legislative districts for 1961, the California Legislature is forced to do so. This is true because:

1. According to Bureau of Census estimates, California will be entitled to seven new U. S. House of Representatives seats after the 1960 census. By federal statute, if the California Legislature fails to reapportion its U. S. House districts by 1962, 30 of its Congressmen would have to be elected from the existing pattern of districts, and the seven new members from the State at large. To have seven at-large U. S. House races in a state like this would be most undesirable, particularly when one considers the cost of at-large campaigns and the fact that the term of office is only two years.

2. The California Constitution (Article IV, Section 6) provides that if the Legislature fails to reapportion assembly districts in the first regular session following a federal census, a Reapportionment Commission shall forthwith do the job. That commission would be composed of the Lieutenant Governor, Attorney General, Controller, Secretary of State, and State Superintendent of Public Instruction. In view of the fact that Members of the Assembly prefer to reapportion their own districts rather than giving the power to anyone else, the threat of the Reapportionment Commission for all practical purposes compels action before the end of the 1961 Session.

II. Assuming, therefore, that congressional and assembly seats will be reapportioned in 1961, I would recommend that the Assembly Interim Committee on Elections and Reapportionment begin planning, even though it is early, for that event. The steps which might be taken are these:

1. In January, 1959, the committee may want to begin a systematic study to determine whether there are any constitutional changes on reapportionment of U. S. House and Assembly districts which should be voted on by the electorate in 1960. Questions which might be considered are:

   a. Should the Constitution be amended to provide that congressional districts be composed of an equal number of assembly districts, thus unfreezing the size of the Assembly and keying it in with the size of the congressional delegation? One of the major criticisms against the 1951 reapportionment was the unequal size of many congressional districts. In part, where the disparities were large, they were the result of the provision in Article IV, Section 27, that in counties with more than one congressional district, congressional districts must be composed of whole assembly districts. This produces some congressional districts made up of two assembly districts, and others made up of three. I believe this proposal warrants serious and bipartisan study.

   b. There have been proposals that congressional and assembly districts not be allowed to go above or below a set maximum allowable deviation, of say 15 percent, from the ideal population size for such a district. Such a requirement for all assembly and congressional districts might conflict with "county line" provisions of the constitution—i. e., as in Article IV, Section 27, where no county may be divided to make a congressional district except where a county has two or more districts; and as in Article IV, Section 6, where there are similar provisions on assembly districts. There are good arguments for retaining these "county line" restrictions. However, a maximum population deviation limit for assembly districts only within counties which have two or more assembly districts could operate without conflicting with "county lines."

   c. Although it traditionally stirs up a political hornet's nest, the question of apportionment of Senate seats among the counties might properly be reopened—not to return to a pre-1926 arrangement with both houses based on population, but to consider some modification of the one-senator-per-county limit for the largest metropolitan counties. The problem which results in now acute, and if present population trends continue it will become more so. If any compromise is to be affected, it is my opinion it would have to be through a small enlargement of the Senate to make room for any extra seats allocated to the largest counties. The object would have to be lightening the representation obligations of large county senators, and not challenging the concept of the federal plan of representation.

2. Sometime in advance of the next reapportionment session of the Legislature, the committee might also:

   a. Establish contact and working relationships with the appropriate official in the U. S. Bureau of the Census to find out what kinds of population data will be available and when. Then the committee will be assured of receiving its information at the

earliest possible date, and may be able to influence the form in which California statistics are provided and the order in which California is handled in relation to other states. In 1951, final census figures for California were not ready until very late in the session; and even preliminary estimates, not until shortly before the start of the session.

b. Secure from the California Legislative Counsel an analysis of U. S. and California statutory and constitutional provisions on reapportionment. (See the 1951 Report of the Assembly Interim Committee on Elections and Reapportionment for the last such analysis.)

c. Provide an opportunity for public, political party, and private group officials to make their wishes on reapportionment known during the planning stage on the bills before the start of the session. In 1950 the committee conducted five public hearings in various sections of the State, and this it might desire to do again.

d. Attempt, early in the planning stage, to reach agreement on the kind of standards which will be used in drawing congressional assembly district lines. Although it is impossible to apply the same standards in the same rank of importance to every situation, some preliminary agreement would be of real value for the committee itself and for those who would present proposals to the committee in hearings or in other ways.

e. Arrange for staff assistance to assembly the population data, to develop whatever political data the members may feel they need, to prepare maps and charts, and to write legal descriptions.

f. By the time the reapportionment bills are presented to the Legislature, have available a mimeo or printed pamphlet, with maps describing the bills and what they do. Such a document should also show representation entitlement by county and section, and what each county and section would receive under the plan.

g. Throughout the bill preparation stage, the committee chairman should himself serve as the channel through which all boundary line decisions are made. If not co-ordinated in this way, and if many different legislators are in a position to make their own changes, chaos could result because there is no boundary decision or change which does not also affect other districts as well.

h. To the extent that it is possible, the committee might attempt to organize its planning and committee and floor stage procedures in such a manner that reapportionment questions do not become involved in other issues before the Legislature.

I hope the above suggestions will be of use to you, and I regret that it was not possible for me to appear before the committee in person.

Assemblyman Conrad reported that he has had correspondence relative to the number of uncontested candidates for judgeships appearing on the ballot; that they feel that where there is no contest the judge should be declared elected. Assemblyman Chapel felt there was not enough favorable interest in such a proposal to carry it out.

Assemblyman Busterud stated that with the possibility of the abolishment of crossfiling in its present form, he thought it important for the committee to give consideration to other changes in election laws, retaining the independence of thought that California has always had. He also recommended that the committee study systems such as the Iowa system where registrations are nonpartisan. Assemblyman Burton commented that nonpartisan filing would work a hardship on political parties in their campaign work.

Mr. Johnson, Legislative Counsel, informed the committee that the Bureau of Public Administration of the University of California is going to conduct a study of what is being done organizationally, procedurally and in the conduct of campaigns by county central committees.

There being no further business before the committee the meeting was adjourned at 11:45 a.m.

August 8, 1958

The Assembly Interim Committee on Elections and Reapportionment met August 8, 1958, at 10 a.m. in Room 2196, State Capitol, with Chairman, Assemblyman W. S. Grant, presiding. The following members were present: Burke, Busterud, Conrad, Francis, Munnell, Porter, and Grant.

Chairman Grant explained that the meeting was held prior to the Democratic State Central Committee Convention for the purpose of obtaining any suggestions which those active in the Democratic Party might wish to present to the committee.

Following a discussion of the abolition of crossfiling, Assemblyman Munnell *proposed,* with the *other members concurring,* that two committee meetings should be held, one in Los Angeles and one in San Francisco, for the sole purpose of studying the system of crossfiling in the State; the meetings to be held after the general elections, with invitations to appear mailed to political scientists and to the heads of both political parties.

Assemblyman Busterud volunteered to have the Legislative Counsel compile up-to-date information on election laws in other states.

A letter from Louis H. Bell, Chairman of the Republican Central Committee of Santa Barbara County, dated August 7, 1958, was read to the committee as follows:

"1. That Paragraph 122 be amended to permit at least 70 days between the deadline date of the primary or general election.

"This change would permit the printing and issuance of the new precinct registers approximately two weeks earlier than at present, thereby allowing precinct workers more time to establish contact with the voters in their precincts.

"2. That the Election Code be amended to prohibit the holding of any municipal or district election to be held less than 45 days prior to any primary or general election.

"This would avoid placing an excessive workload on the county clerk's offices just before the vitally important statewide elections.

"3. That the Elections Code be amended to provide for election of county central committee members at the general election rather than at the primary election.

"This would provide greater continuity of policy and operations than at present inasmuch as committee chairmen and personnel would serve through the whole campaign, both during the primary and general elections which should be regarded as a continuing operation.

"A change in leadership can frequently be harmful to success.

"4. That all county central committees be elected for four-year terms rather than two-year terms as is generally the case at present."

A discussion was held regarding the expansion of the membership of the Legislature, Assemblyman Conrad recommending that the committee should study this matter.

Assemblyman Francis proposed that the committee include in its agenda a study of uniform laws of procedure for county clerks.

There being no further business before the committee, the meeting was adjourned at 11 a.m.

WHAT PARTIES MAY USE THE PRIMARY?

Alabama

A party must poll at least 20 percent of the total vote at the last general election in order to be eligible to use the primary. Primary is not mandatory, but optional to a party which qualifies. A party may choose not to nominate by primary, but must indicate this decision at least 60 days before the primary date.

Arizona

A party which at the last preceding state or county or city general election cast for its candidates not less than 5 percent of the total votes cast. A new party shall be eligible for recognition by filing a petition signed by at least 2 percent of the number of votes cast for governor in the last election in at least five counties. For local primary, a new party must file a petition signed by qualified voters from at least one-fourth of the election precincts of the city or county, totalling at least 3 percent of the total vote cast for mayor (city) or county attorney (county).

Arkansas

Any organized political party.

California

Any party which received 3 percent of the total vote cast, if its candidate did not crossfile, or 6 percent if he did crossfile (run in the primary of other parties as well as in his own party primary), at the preceding gubernatorial election. Or * * * if voters equal to 1 percent of the total vote cast at the preceding election indicate their intention to affiliate with the party. All such parties which qualify must use the primary. A party is barred from the primary if its total vote

at the preceding gubernatorial election fell below one-tenth of 1 percent of the total vote cast.

Colorado

All political parties which polled at least 10 percent of the total votes cast for governor at the last preceding general election must use the primary for nominating candidates for all offices.

Connecticut

All parties which received at least 10 percent of the total vote cast at the last preceding election for the office concerned.

Delaware

Any party which polled at least 10 percent of the total vote cast in the previous general election may use the primary. It is entirely optional.

Florida

Any group may be recognized as a political party which on January 1st preceding a primary election has registered to vote as members more than 5 percent of the total registered electors of the state. Primary mandatory.

Georgia

The primary is optional; traditionally only the Democratic Party holds a primary.

Idaho

Mandatory to all parties which polled at least 10 percent of the total vote cast for any office within the state at the preceding general election, providing they had at least three candidates for state office on the general election ballot.

Illinois

Any political party which polled more than 5 percent of the total vote cast in the last general election for state and county offices in the entire state is eligible to nominate all elective offices by primary, and must do so. Political parties polling more than 5 percent of the total vote cast within any political unit may nominate for offices within the unit (congressional districts, cities, etc.). No political organization associated with Communist, Fascist, Nazi or other un-American principles and is subversive in activities or propaganda shall qualify. To nominate candidates for state senator and state representative, a political party must have polled at least 5 percent of total vote cast, in last gubernatorial election, for governor.

Indiana

Political parties which polled at least 10 percent of the total votes cast for a leading statewide candidate at the preceding general election must use the primary to nominate candidates.

Iowa

Any political party which at the last preceding general election cast for its candidate for governor at least 2 percent of the total vote cast in the election.

Kansas

Any political party which received at least 5 percent of the total vote for secretary of state at the last preceding state election (1955). Mandatory with a few minor exceptions.

Kentucky

Mandatory to political parties which polled at least 20 percent of the total vote cast at the last presidential election.

Louisiana

All political parties which polled at least 5 percent of the total vote cast in the last preceding gubernatorial election or presidential election must use the primary.

Maine

Mandatory to political parties which polled for governor at the preceding gubernatorial election at least 1 percent of the total vote cast for governor.

Maryland

All parties polling at least 10 percent of the entire vote cast in the preceding election in the state must use the primary for nominations of candidates.

Massachusetts

Political parties which at the preceding state election polled for governor at least 3 percent of the total vote cast. Municipal parties which poll in a city or town at least 3 percent of the total vote cast for major or selectman may use the city primary on petition. State primaries mandatory.

Michigan

Political parties which have polled at least 5 percent of the total vote cast in the preceding general election must use the primary.

Minnesota

Political parties which polled at the preceding general election not less than 5 percent of the total vote cast, for at least one office. Statewide candidates are party candidates; most others are nonpartisan candidates, by law. Mandatory.

Mississippi

Mandatory to "properly organized" political parties.

Missouri

Every recognized party must use the primary for offices to be elected at general state election. Nonpartisan candidates appear on a nonpartisan ticket.

Montana

Mandatory to all political parties which polled at least 3 percent of the total vote cast for congressmen in the preceding congressional elections.

Nebraska

A political party which polled at least 5 percent of the total vote at the previous election. Mandatory.

Nevada

Mandatory to all political parties which polled for any of their candidates at least 5 percent of the total vote cast for Congressmen, and also to political organizations which file a petition signed by a number equal to 5 percent of the total vote, declaring themselves a political party and requesting participation in the primary. This statute is by law to be liberally construed to provide minority parties with use of the primary for the nomination of candidates.

New Jersey

Mandatory for all political parties which at the preceding election of members of the General Assembly (state legislature) polled for their candidate at least 10 percent of the total vote cast.

New Mexico

Must be used by all political parties any of whose candidates polled at least 15 percent of the total votes cast for governor in the preceding general election.

New York

Every party which at the preceding gubernatorial election polled at least 50,000 votes for governor must use the primary for the offices which can be nominated by primary.

North Carolina

Mandatory to all political parties which polled at least 10 percent of the total vote cast at the preceding general election.

North Dakota

Any political party which polled at least 5 percent of the total votes cast for governor at the last general election, and any other party by petition of 15,000 signatures and other requirements. Primary mandatory for recognized parties.

Ohio

Mandatory to any political party which polls 10 percent of the total vote cast for governor at the preceding election.

Oklahoma

Any political party which polls at least 5 percent of the total vote cast in the state for President or governor at the preceding such election must use the primary. Any party which polls at least 10 percent of the total vote cast in three other states at such election will be considered a legal party in Oklahoma and must use the primary. However, no political party in any way connected with the Communist Party or with any foreign agency or party advocating revolution, etc., may use the primary or any other election.

Oregon

Any political party which polled at least 20 percent of the total vote cast for presidential electors at the last general election preceding the primary must use the primary for nominating candidates.

Pennsylvania

Mandatory to all political parties which polled at the preceding general election at least 2 percent of the total vote cast in the state, or 2 percent in at least 10 counties.

Rhode Island

Any political organization which polled for its candidates for governor at least 5 percent of the total vote cast in the state for governor, at the preceding general election. Primary is mandatory for all such parties.

South Carolina

Optional to certified parties: those parties which had a candidate for President and Vice President in 1948. Other parties may use a primary by petition signed by 10,000 party members. Nominations may be made by primary, convention, or petition, at the decision of the party.

South Dakota

Mandatory to political parties which polled at the preceding gubernatorial election at least 10 percent of the total vote cast for governor. Others by petition.

Tennessee

Political parties which polled more than 10 percent of the total vote cast for governor in the preceding general election must use the primary.

Texas

Mandatory to parties which received at least 200,000 votes at the preceding gubernatorial election; optional to parties receiving over 10,000 but under 20,000 votes.

Utah

Mandatory to political parties which polled at the preceding general election of congressmen at least 2 percent of the total vote cast in the state for that office. The primary may be used by other parties by petition.

Vermont

Any political party which at the preceding election polled at least 5 percent of the entire vote of the state for governor. All such parties must use the primary.

Virginia

Any political party has the right to nominate by direct primary. Not mandatory. A political party is one which polled at least one-fourth of the total vote cast in the state at the presidential election last preceding the primary.

Washington

"Major political parties" must use the primary. A major political party is: in a statewide election, any party of which at least one candidate received at least 10 percent of the total vote cast in the last preceding statewide election. For any political subdivision of the state a party can qualify as a major party by receiving 10 percent of the total vote cast in that subdivision.

West Virginia

Mandatory for every political party which polled for its candidates for governor at least 1 percent of the total vote cast for governor, at the last general election.

Wisconsin

Any political party any of whose statewide candidates received at least 1 percent of the total vote cast for the office at the preceding general election.

Wyoming

Mandatory to political parties which polled at the preceding congressional election at least 10 percent of the total vote cast for congressman.

MODEL DIRECT PRIMARY SYSTEM OF THE NATIONAL MUNICIPAL LEAGUE

Who May Use the Primary?

Mandatory for political parties which polled 10 percent of the vote cast at the preceding election. Not available for smaller parties.

WHAT IS THE DATE OF THE PRIMARY?

Alabama

The first Tuesday in May in even-numbered years. The run-off primary where necessary the fourth Tuesday thereafter.

Arizona

On the eighth Tuesday prior to any general or special election, for state, judicial, county and party elections. Not less than than 30 days before municipal elections.

Arkansas

General primary, second Tuesday in August; preliminary or "preferential" primary two weeks earlier.

California

The first Tuesday after the first Monday in June of even-numbered years.

Colorado

The second Tuesday in September in even-numbered years. Local primaries, for other than general elections, four weeks before the election.

Connecticut

State and district offices: Eighth Wednesday after the close of party state convention. Party which elected the governor in last gubernatorial elections selects ninth Wednesday in case party conventions adjourn so that eighth Wednesday is same for both parties. These primaries occur in even-numbered years.

Delaware

The date is the decision of the parties. No two parties may hold their primaries on the same day, and all primaries must be held between the last day of registration in July and the last Saturday in August. In Wilmington, primaries are held in May.

Florida

First primary on the first Tuesday after the first Monday in May. Second primary (run-of) on the fourth Tuesday after the first Monday in May.

Georgia

The date is fixed by the State Democratic Executive Committee which is made up of people suggested or approved by the governor, for the most part. This committee can choose not to have a primary; in regular election years this would mean that candidates would be selected in a party convention. At other times (to fill vacancies, etc.) it would mean that the committee would nominate the candidates. For cities over 200,000, the primary is the second Wednesday in May, with runoff primary two weeks later.

Idaho

The second Tuesday of August in even-numbered years.

Illinois

Second Tuesday in April (30 weeks before election) in even-numbered years. Second Tuesday in February (seven weeks before municipal elections in cities of 500,000 pop. and over 50,000 pop.) in odd-numbered years. Last Tuesday in February (five or seven weeks before election in Chicago; first Tuesday in April; village and city election: third Tuesday in April) in odd-numbered years.

Iowa

The first Monday in June of each even-numbered year. Certain municipal primaries, first Monday in October of the year general municipal elections are held.

Kansas

First Tuesday in August for general elections, in even-numbered years; city primaries in cities over 10,000 except commission or commission manager cities, first Tuesday in March; commission or commission manager cities of the first or second class, second Tuesday before the election. No city primary in smaller cities. No city primary unless there are contests.

Kentucky

First Tuesday after the fourth Monday in May (1956).

Louisiana

For governor and other state officials, the third Tuesday in January. (Four year term.) For U. S. Senator and Congressmen (when a Senator is to be elected the same year as congressional elections), the last Tuesday in July. Primaries for all other offices, district, parochial, and ward, or municipal, are held at the same times if they are to be elected at the same time, *i.e.*, in January in years of gubernatorial elections, in July in years of congressional (off-year) elections.

Maine

The third Monday in June in even-numbered years.

Maryland

The second Monday in September except in presidential years, when it is held the first Monday in May.

Massachusetts

State primary, on seventh Tuesday preceding state elections (biennial). City primary, on third Tuesday preceding regular city election. Town primary, on second Tuesday preceding regular town election. Primary before special election third Tuesday before such election. Presidential primary last Tuesday in April.

Michigan

Formerly the Tuesday after the second Monday in September, for state and county primary; now in August. The third Monday in February for city primaries.

Minnesota

Second Tuesday in September, preceding general election. Seven weeks preceding any city election in cities of the first or second class.

Mississippi

The fourth Tuesday in August (1954); runoff primary three weeks later. Congressional primaries (also U. S. Senator) fourth Tuesday in August, runoff primary three weeks later.

Missouri

The first Tuesday of August in even-numbered years.

Montana

The first Tuesday of June.

Nebraska

First Tuesday in April in even-numbered years. The primary in presidential years includes the preferential presidential primary. For elections other than November, the primary is the fourth Tuesday before election.

Nevada

The first Tuesday in September.

New Hampshire

The second Tuesday in September.

New Jersey

The third Tuesday in April every year.

New Mexico

The primary is held on the first Tuesday after the first Monday in May of each even-numbered year. (Changed from June in 1951.)

New York

Set annually by the legislature (1956).

North Carolina

The last Saturday in May; the runoff primary four weeks earlier.

North Dakota

The last Tuesday in June in years when there is a general election.

Ohio

The first Tuesday after the first Monday in May.

Oklahoma

The first Tuesday in July in even-numbered years, for the regular primary. The runoff primary if necessary is held on the fourth Tuesday in July.

Oregon

The third Friday in May of even-numbered years.

Pennsylvania

The third Tuesday in May of even-numbered years, except in presidential years when it is the fourth Tuesday in April.

Rhode Island

The two parties which qualify (R and D) hold their primaries, by law on separate days. The primary is every two years. One party primary is the third Monday in September, the other the second Wednesday after the third Monday in September, in even-numbered years. The parties alternate as to which has the earlier date. Cities and towns having elections at other times of the year have their party primaries not later than 30 days before such election.

South Carolina

The second Tuesday in June (1956). If a second and third primary are necessary, they follow at two-week intervals.

South Dakota

The first Tuesday in June of even-numbered years.

Tennessee

The first Thursday in August of even-numbered years. This is also election day for judicial and county civil officers.

Texas

Thirteen weeks before general election, in even-numbered years. (The fourth Saturday in July.) The runoff primary is the fourth Saturday in August.

Utah

The second Tuesday after the first Monday in September, in even-numbered years.

Vermont

The second Tuesday of September of each even-numbered year.

Virginia

A. For the nomination of candidates to be voted on at the November general election, the Tuesday after the second Monday in July.

B. For municipal elections in June, the primary is the first Tuesday in April.

C. The second, or runoff primary, when candidates fail to win a majority in the first primary, is the fifth Tuesday after the first primary.

Washington

The second Tuesday in September for the November elections. For elections at other times the primaries are held four weeks before the election.

West Virginia

The second Tuesday in May in presidential years.

The first Tuesday in August in other even-numbered years.

Wisconsin

The second Tuesday of September of each even-numbered year. Spring primary optional for city elections, which are nonpartisan.

Wyoming

The first Tuesday after the third Monday in August.

WHAT OFFICES ARE NOMINATED BY PRIMARY?

Alabama

State, national, district, circuit, county, and municipal offices may all be nominated by primary if the party wishes. Optional election of party offices.

Arizona

State, senatorial, congressional, judicial, county, municipal, precinct offices. Party offices elected.

Arkansas

U. S. Senators, Congressmen, state, district, county, township, municipal. Party offices elected.

California

U. S. Senators, Congressmen, state, district, legislative, on a party ballot. On nonpartisan ballot, judicial, county, special district, city and school offices. Party offices elected.

Colorado

U. S. Senators, Congressmen, all elective state, district, city, county, ward, precinct offices. Not delegates to national party conventions, vacancies in unexpired terms, presidential electors, or municipal offices of "incorporated towns." Party offices elected.

Connecticut

State, congressional district, municipal, town, some convention delegates and party offices elected.

Delaware

Any elective office may be nominated by primary, except U. S. Senators, by convention.

Florida

State offices (governor, attorney general, secretary of state, comptroller, treasurer, superintendent of public instruction, commissioner of agriculture, state legislature. Members of railroad and public utilities commission, supreme court justice, circuit judges, state attorneys). County offices (long ballot). U. S. Senators and Representatives. Party office elected.

Georgia

State (long ballot), congressional, legislative, judicial, county, city: all at the option of the respective party committees.

Idaho

U. S. Senators, Congressmen, all elective state, district, and county offices. Party offices elected.

Illinois

State and county offices (even numbered years); city, township, and village offices (odd-numbered years). Presidential electors; trustees of the University of Illinois; circuit, superior, and supreme court judges are nominated by party convention.

Indiana

Congressmen, state legislators, judges, prosecuting attorneys, and all county officers are nominated in the primary. Party officers are elected.

Governor and all other statewide officers, U. S. Senators, and presidential electors are nominated by state party conventions.

Iowa

Governor, lieutenant governor, secretary of state, auditor of state, treasurer, secretary of agriculture, attorney general (two year terms), U. S. Senators and Congressmen, commerce commissioners, state sena-

tors (four year), state representatives, county officers, supervisors, township officers.

Certain city officers in certain municipalities.

Party offices elected.

Kansas

All elective offices to be voted on by the ensuing election. U. S. Senators, Congressmen, state, legislative, judicial, county, city, township, etc. Party offices elected.

Kentucky

All elective offices except education offices and city offices in certain cities and presidential electors.

Louisiana

U. S. Senators, Congressmen, state officers, district, parochial and ward offices, state legislative offices, all city and ward offices in cities over 5,000. Party offices elected.

Maine

U. S. Senators, Congressmen, state legislature, all state and county offices.

Maryland

All candidates for public office in Baltimore City, and the counties; judges, and Congressmen.

All party committeemen and delegates to the various party conventions are elected.

Governor, attorney general, comptroller, and U. S. senator are nominated in state party conventions, with certain provisions.

Massachusetts

Governor, lieutenant governor, secretary of state, state treasurer, state auditor, attorney general; U. S. senators and congressmen; state senators and representatives; county, city, town offices. Party offices elected.

Michigan

Governor, lieutenant governor, U. S. senator, some county and district offices, congressmen, state legislators, judges. Delegates to county convention elected. Judicial ballot nonpartisan.

Minnesota

On party ballot: statewide offices including governor, lieutenant governor, secretary of state, treasurer, and attorney general. U. S. senators and representatives.

On nonpartisan ballot: all judges; members of the state legislature; all elective county offices, and municipal offices in cities of the first and second class.

Party nominees to public office elect state and other party committees, after primary.

Mississippi

All elective offices; state, district, county, county-district.

Missouri

All candidates for elective office in the state, with exception of: county superintendents of schools, city officers not elected at the biennial November election, town, village, and district officers. Party offices elected.

Montana

Senatorial, state, district, county, city offices in cities over 3,500. Judges are nominated by nonpartisan ballot. Party offices are elected.

Nebraska

Partisan: statewide—governor, lieutenant governor, secretary of state, auditor, treasurer, attorney general, railway commissioners, U. S. senators; county and city (over 25,000) offices; congressional. Party offices elected.

Nonpartisan: supreme court justices, district, county, and municipal judges, state legislature (unicameral), state education superintendent, state university regents, director of public power and irrigation, director of reclamation.

Nevada

All offices to be elected at the general election: U. S. senators, congressmen, state, district, county, township, state legislature, on partisan ballot; all judicial and school offices nonpartisan.

New Hampshire

All elective offices: governor, other statewide offices, U. S. senators and congressmen, state legislators, county offices, etc. Party offices elected.

New Jersey

All public offices to be voted on in the general election, except presidential electors. Party offices elected.

New Mexico

U. S. senators, congressmen, presidential electors, all elective state, district legislative, county and precinct officers. Does not apply to city, town and village offices. Manner of selecting party officers determined by party.

New York

Congressmen; county and city offices; state legislators; town offices in counties of over 750,000 population; optional to other towns.

Party offices are elected.

Presidential electors are nominated by state party committees.

Statewide offices are nominated by state party convention.

Justices of the supreme court are nominated by judicial district convention.

North Carolina

U. S. senator, congressional, state, district, legislative, county, township.

North Dakota

Congressional, state (long ballot), legislative, judicial, county, district.

Ohio

U. S. senate, state, district, county, municipal. Party offices elected.

Oklahoma

It is mandatory that the primary be used for the nomination of all candidates in all elections for state, district, county, and municipal offices and U. S. senators, by all political parties. Governor, lieutenant governor, and 13 other state officials are elected at one primary, as well as judges. (Long ballot.)

Oregon

All offices to be voted on at the general election: U. S., state, district, county, city, town, and precinct offices. Party offices elected.

Pennsylvania

All elective offices: U. S. senator, congress, state, etc. Party offices elected.

Rhode Island

U. S. senators and congressmen, all statewide offices, state legislators, mayor, local officials, etc. Short ballot. Party offices are elected at the primary.

South Carolina

Any elective office, state, congressional, legislative, county, township, may be nominated by primary.

South Dakota

U. S. senators, congressmen, governor, county, and legislative offices. Party offices elected. Judicial and school offices on nonpolitical ballot. Other state offices are nominated by party state convention after primary.

Tennessee

Statewide offices: governor, United States senator, and public service commissioners.

Congressmen and state legislators.

State party committeemen are elected at the primary.

Texas

U. S. senator, congressmen, state, district, county, and precinct offices. Party offices elected.

Utah

On partisan ballot: U. S. senators, congressional, state, district, county, some judicial, precinct.

On nonpartisan ballot: justices of supreme court and district court judges.

Vermont

U. S. senators, congressmen; governor, lieutenant governor, state treasurer, secretary of state, auditor, attorney general; state legislators, judges, county officers, not town, village, school or fire district offices. Party offices not elected in primary, but by caucus.

Virginia

U. S. senators, any state office, any district office, members of the house of delegates (legislature), any city, town, or county office, congressmen. Political parties may make their own rules and nominate by convention unless a primary has already been declared as the method.

Washington

Party primary: all candidates for state, congressional, legislative, county, municipal, and precinct offices, with certain exceptions.

Nonpartisan: primary: all city primaries for cities of the first, second and third class are nonpartisan.

Party committeemen elected at general election, not at primaries.

West Virginia

Statewide, congressional, state legislature, county and magisterial district candidates. Judges at some levels not nominated by primary. County boards of education nominated on nonpartisan ballot. Cities may use primaries. No presidential elector nominated by primary. Party committeemen elected at the May primary every four years.

Wisconsin

State, congressional, state legislative, county offices, in September party primaries. Nonpartisan in optional spring primary: judicial, school, county board in counties over 250,000, and all elective city offices. Party officers elected at September primary.

Wyoming

U. S. senators, congressional, state, district, county, etc., by partisan ballot. Judicial and school offices by nonpartisan ballot.

Party offices elected.

HOW DO CANDIDATES GET NAMES ON THE PRIMARY BALLOT?

Alabama

By a declaration of candidacy filed with the party, plus payment of party assessment, not to exceed 2 percent of salary of office. The party executive committee then certifies to the Secretary of State or the county probate judge the list of candidates to appear on the ballot. There is no writein provision.

Arizona

By filing a nominating petition signed by the candidates, giving address, party of which he wishes to be a candidate (or that he wishes to become a nonpartisan candidate), date of election and primary and office for which he wishes to run.

Arkansas

By "party pledge" (affirming loyalty to party) and "ballot fees" to party, the amount specified by the party, at least 90 days before the primary. Failure to pay the party assessment bars a candidate from the ballot.

If there are three or more candidates for nomination for the same office, the preliminary or preferential primary is held two weeks before the regular primary, with the top two running in the general primary. If there are two candidates, they appear on the general primary ballot, and the preliminary primary is unnecessary. If there is only one candidate, he is declared nominated without appearing on any primary ballot. If one candidate gets a majority on the preliminary primary, the general primary is not used for that office.

No writeins are allowed.

California

By "declaration of candidacy" filed either by the candidate or his "sponsors." There must be sponsorship affidavits, signed, filed for the candidate. If the candidate crossfiles, there must be separate sponsorship affidavits, signed and filed by members of each party in which he files for the primary. The County Clerk provides the forms. The sponsorship procedure is similar to that of petitions in other states. The number of sponsor signatures required are:

For statewide office	not less than 65 nor more than 100
For congress, other part-state	not less than 40 nor more than 60
State legislature	not less than 20 nor more than 30
Other	not less than 10 nor more than 20

There must also be a filing fee paid for each party primary the candidate files in:

Statewide office	2% of salary of office for 1 year
Congressional, etc.	1% of salary of office for 1 year
State legislature	$20

Writeins are allowed.

Colorado

(1) Designation by assembly (preprimary convention): Party conventions hold before the primary, at which candidates are designated. Every candidate who receives at least 20 percent of the convention vote is designated for the primary ballot. Only one convention ballot is taken for each office. Those receiving the necessary 20 percent are certified by the officers of the convention, and the certifications filed in the same manner as designating petitions. Or—

(2) Petitions, signed by not less than 300 party voters for offices above the county level, by not less than 100 for any other office. For statewide office, by at least 2 percent of the highest vote cast by the party for the office in each congressional district at the preceding general election.

Writeins allowed.

Connecticut

(a) For state and district office, party conventions meet between June 1st-July 15th, choose one candidate for nomination for each office, by convention vote. These candidates are "party-endorsed."

(b) The conventions immediately report the list of endorsed candidates, plus a list of all other candidates who received at least 20 percent of the convention vote, to the secretary of state.

(c) The list of endorsed candidates, plus the list of "20 percent" candidates, is published with a notice that a primary is available if any losing "20 percent" candidate wishes to file for the primary ballot. No one other than a candidate whose name is on the 20 percent list for an office can file for the office.

(d) If no such candidate files, the party-endorsed nominee is declared the party candidate for the general election, and no primary is held for that office.

(e) If anyone on the "20 percent" list wishes to run in the primary, he must file a petition within 14 days of the convention, signed by:

Statewide office ..... 5,000 signatures
Congressional ..... 2,000 signatures
Other (district)—5 percent of party enrollment of political area concerned and a filing fee equal to 5 percent of the salary of the office desired. This fee is returned if he polls 15 percent of the party vote for the office in the primary.

Town candidates are endorsed by town committees. There is no 20 percent requirement for nonendorsed candidates; any qualified party member of the town may run.

Municipal candidates: Anyone qualified may run. Petitions require 5 percent of party enrollment for signature, and filing fee of $25 for public, $5 for party office.

All petition forms are provided. Voting machines must be used as far as possible, in primaries.

Delaware

By notifying the county committee of the party, in writing, at least 15 days before the primary, of intention to be a candidate.

Florida

A candidate must file a sworn statement that he voted for a majority of his party's candidates in the last election and pledges to do so at the next, that he has paid his party assessment as a candidate, and has not violated any election or registration laws. The law is very strict on campaign expenses.

A candidate must pay a filing fee of 3 percent of the annual salary of the office. The party assessment of not more than 2 percent of the annual salary is levied by the executive committee of the party.

A candidate who has filed his sworn statement, paid the filing fee and the party assessment, is entitled to have his name on the primary ballot; if he has no opposition, he is declared nominated without appearing on the primary ballot.

Georgia

The party executive committees determine the requirements and fix the entry fee required of candidates * * * the state committee for statewide offices, the county committee for county offices, etc. The rules of the party must be publicly announced. The closing dates for filing are also fixed by the party committees. All such rules and requirements may change from year to year, and from county to county for county offices.

Idaho

By declaration of candidacy, accompanied by a petition and a filing fee. Petition requirements:

Congressional or state office, not less than 200 or more than 300 party members, not more than 25 of whom may be from one county. All others, including state legislature, not less than 5 or more than 10 party members.

Judicial offices, for nonpartisan ballot, may be signed by any qualified voters.

Filing fee requirements:

$2 if salary is $300 or less. If salary of office is over $300, an additional fee of 1 percent of the amount of the salary over $300 is required.

Writeins allowed.

Illinois

By nominating petition signed by: for state office, not less than 5,000 party members, or more than 10,000. Likewise for United States Senator.

For congress or national convention delegate, at least one-half of 1 percent of qualified party members in congressional district.

For county office, at least one-half of 1 percent of qualified party members figured on preceding county election.

For city, town or village office voted on by entire city, etc., one-half of 1 percent of qualified party members in political unit concerned.

For party office: 10 signatures of party from congressional district, for state central committeeman;* 10 for precinct committeeman; 10 to 16 for ward committeeman; 5 percent to 8 percent of party for township committeeman. For any other office, at least 10 qualified members of party in district concerned.

All petitions must carry an oath sworn by candidate that he is not connected with any communist organization or any foreign political agency advocating overthrow of the government by force.

Whenever there are no contests, no primary is held.

Writeins allowed.

Indiana

By declaration of candidacy filed between 40 and 70 days before a primary.

No petition is required to accompany the declaration of any candidate except for delegates to state party convention. These candidates must file a petition signed by 10 legal voters of their party, and have up to 30 days before the primary to file.

Any candidate who is unopposed in the primary is considered nominated (or elected, if for party position) and his name does not appear on the primary ballot.

Iowa

By nominating petition, furnished by the Secretary of State for statewide offices, by the county auditor if papers will be filed in his office; signed for state office or U. S. Senator, 1 percent of qualified voters of the party in each of at least 10 counties of the state, total to be not less than one-half of 1 percent of total party vote of state in last election.

* At least 100 of the primary electors of his party from his congressional district.

For congressman, or certain state senators (representing more than one county) at least 2 percent of party voters in at least half the counties of his district, total to be not less than 1 percent of total party vote of district.

For county offices, 2 percent of party vote for governor in last election in counties.

Writeins allowed.

Kansas

Either by petition (nomination papers) or by declaration of candidacy and filing fee.

Petition requirements:

For statewide office	not less than 1% nor more than 10% of party voters
Congressional office	not less than 2% nor more than 10% of party voters
County office, etc.	not less than 3% nor more than 10% of party voters

Signatures must be from a certain proportion of the total political area.

Filing fee requirements:

Presidential electors	$10.00
All offices with salary:	
Over $1,000 a year	1% of one year's salary including mayors
Under $1,000 a year	5.00
State senator	10.00
State representative	5.00
Township trustee	1.00
Other township offices	.50

Other offices in proportion. Fees go into general revenue.

Kentucky

By "notification and declaration," plus an affidavit signed by two members of his party. Judges of the court of appeals and the circuit court may file for nomination of every party.

A fee of $1 must be paid to the county clerk.

No writeins are allowed.

If there is no contest for nomination for an office, the candidate is declared nominated without appearing on the primary ballot.

Louisiana

By declaration of candidacy and filing fee: All candidates above the local level file their declaration and filing fee of $100 with the party committee concerned. If within a certain length of time no objection to the candidate is filed with the chairman of the party committee, or if such objections are determined to be without merit, the party chairman forwards the declaration and the filing fee to the Secretary of State. The party committee may then assess the candidate not more than $110, of which not more than $25 is sent to the state party committee.

The procedure for candidates on the local level is the same, except that the filing fee for district and parish offices is $5 and for ward offices $1. The party assessment limit is $25 and the amount forwarded to the state party committee not more than $5 for district and parish and $1 for ward offices. Candidates who do not pay their party assessment are barred from the primary ballot. If there is no primary contest, the candidate is declared nominated without primary vote.

Maine

By filing nomination papers (petitions) signed by qualified party members equal to not less than 1 percent or more than 2 percent of the entire vote cast for governor at the preceding general election in the state, for statewide office, or in the political subdivision which the office represents. Writeins are allowed.

Maryland

By filing a certificate of candidacy and paying a filing fee. Candidates for statewide office, who are nominated by state party convention, file the same certificate and pay a filing fee. Their names appear on the primary ballot, to be voted on, and the vote is a binding instruction to the delegates to the convention (i.e., the delegates elected from any district must vote in convention for the candidates for state office nomination who received the highest vote in the district's primary for the party). The filing fees are as follows:

For statewide office	$270
For Congress	100
Others	25 for each county in which his name appears
Party offices, except for Baltimore	00.00

Filing must be done 10 weeks before the primary.

If there is no contest, the candidate's name does not appear on the primary ballot.

Writeins not allowed (1956).

Massachusetts

For statewide offices candidates get on primary ballot by certification of preprimary convention or by petition signed by at least 2,500 party members, not more than 500 from one county (1955). For offices elected at state election but not elected by all the voters of the state, such as congressman, nomination papers must be signed by a number of qualified voters equal to five for each ward and each town in the district or county, but not more than 250 required. In any city or town which nominates its offices by primary, the city or town clerk furnishes the nomination papers, which must be signed by a number of qualified voters equal to at least five for each ward represented. Writeins allowed.

Michigan

By petition signed by a minimum of 1 percent and a maximum of 4 percent of total vote cast for latest secretary of state. In counties with one or more representatives to state legislature, minimum petition or $100 (returnable to winners and closest runners-up).

Blank petition forms furnished by county and city clerks. If there is no contest, candidate is considered nominated. Writeins are allowed.

Minnesota

By filing an affidavit stating name, residence, office, political party if for political party ballot; plus a fee of $50 for statewide office, congress, and supreme court judges; $20 for office to be voted on by more than one county; $10 for office within a county. Judges of supreme court and district court may be placed on primary ballot without affidavit

with petitions signed by 500, or 250, qualified voters, respectively, and the filing fee.

Filing fee for U. S. Senators	$100

If only one candidate for a political party ballot files, his name is not placed on the primary ballot but he is declared nominated and appears on the general election ballot.

Writeins allowed in most cases.

Mississippi

By affidavit of candidacy, filed either with the circuit clerk or the party executive committee, plus fee paid to party committee:

Statewide office, not over	$100.00
State districts, congress, not over	50.00
State senator	5.00- 7.50
State legislature; county	5.00
Other	2.50

These fees go into party treasury.

Writeins used only in case of death of a candidate before the primary.

Missouri

By filing a Declaration of Candidacy, and by paying to the state or county committee of his party the following amount of money:

For statewide office	$100.00
For congressmen	50.00
For circuit judge or state senator	25.00
For state representative or county office	5.00

Receipts for these payments must be filed with the declaration of candidacies.

Montana

By "petition for nomination" which is a statement of intent to run, signed by the candidate, plus a filing fee:

Any office with salary up to $1,000 a year	$10.00
State legislators	15.00
Any office with salary over $1000 a year	1% of year's salary

Other offices in proportion.

No fees for party office.

Writeins are allowed on the primary ballot.

Nebraska

Partisan: By filing either a written application signed by the candidate, or applications signed by 25 qualified party members for his candidacy. In the latter case the candidate must sign an affidavit that he will abide by the primary and qualify if elected, within five days of the filing of the applications. When he files himself, he signs the affidavit at that time. Filing fee $5 to $50 (1953).

Nonpartisan: By filing applications or affidavits, making no reference to political affiliation, and by paying a fee of $10 to his county treasurer. No fee required for University of Nebraska Regents, presidential electors, delegates to national, state, and county conventions, board of education members.

Writeins allowed.

Nevada

By filing a declaration of candidacy; or by filing an "acceptance of nomination" if his name has been presented as a candidate by the written designation of 10 or more qualified members of his party (for a partisan nomination) or 10 or more qualified voters of any parties (for a nonpartisan office); and by payment of a filing fee as follows:

U. S. Senator	$250
Congressmen, governor, justice of supreme court	150
Any other state office	100
Any district office	75
Any county office	40
State senator	30
Assemblyman	15
Justice of peace, constable, other town or township office	10

No fee for office that receives no compensation.

No provision for writeins.

If no contest, candidate is declared nominated without appearing on the primary ballot.

New Hampshire

By declaration and filing fee; or petitions signed by party members and written consent of candidate:

Governor, U. S. Senator	$100	200 signatures
Other statewide offices and congressmen	50	100 signatures
Councilor	25	50 signatures
State senator	10	15 signatures

County offices, local offices proportionately.

If no candidate declared or petitioned for an office, nomination may be made by the party committee of the state, county, ward, etc., concerned; the above filing fee or petition requirement must be fulfilled, and the candidate's name then appears on the primary ballot. Writeins allowed.

New Jersey

By petition, accompanied by signed acceptance of candidacy by the candidate.

Petition requirements (signatures by qualified members of the party):

For statewide office	at least 1,000
Congressional district	at least 200
Countywide offices	at least 100
Municipalities over 14,000 population	at least 50
Other municipal offices	at least 25
Election district	at least 10

Writeins allowed.

New Mexico

Candidates for: U. S. Senator, congress, presidential electors, and all elective state offices except state legislature and judicial district officers: by designation by pre-primary party convention. The part must hold its convention on or before the first Tuesday in March of even-numbered years. The delegates vote only one ballot on each office to be filled, and no one may vote for more than one candidate for one office. Every candidate who receives at least 20 percent of the convention vote will be certified to be placed on the primary ballot as candidate

for nomination. If for any office no one receives 20 percent of the convention vote on the first ballot, further ballots must be taken until one or more candidates receive the necessary 20 percent. Certificates of designation are then filed with the secretary of state by the officers of the convention, stating the percentage of convention vote each candidate received. Candidates for each office are then placed on the primary ballot in the order of the votes received.

Candidates for state legislature and judicial district officers may be designated by county convention in the same manner, or by declaration of candidacy accompanied by a nominating petition signed by 50 qualified party members for state legislators or district judges, 25 for county offices, 5 for precinct offices. All such declarations and petitions must be accompanied by a filing fee equal to 3 percent of the first year's salary of the office.

Anyone not designated by party convention who wishes to run for any office may also use the declaration and petition method of getting on the ballot. In this case the petition signature requirements is in general 2 percent of the party vote for the office at the preceding election. The filing fee is the same.

No one can be a party candidate unless he has been a member of the party for at least six months.

Writeins allowed.

New York

By filing a designation petition signed by 5 percent of the enrolled party members of the political subdivision concerned, with the following maximum number required:

For any citywide office in New York City	5,000
For any county or boroughwide office in New York City	2,500
For any citywide office in any other 1st class city	1,000
For countywide office in county of over 250,000	1,000
For congress or state senate from New York City	750
For congress or state senate elsewhere	500
For countywide office in counties 25,000-250,000	500

Other offices in proportion.

Names to be voted on within the same political subdivision may be grouped on one petition.

Writeins allowed.

North Carolina

By filing a "Notice (of candidacy) and pledge (of party membership and intention to run if nominated)"; and by payment of a filing fee: 1 percent of a year's salary for all offices receiving a salary, $5 for fee-paid offices.

If there is no primary contest, the single candidate is declared nominated without appearing on the primary.

North Dakota

State offices, U. S. senators, congressmen, judges of supreme and district courts: by petition signed by 3 percent of total party vote at last general election, but not more than 300 names required. (Judges and school and tax commissioners go on no-party ballot, with 300 petition signatures required by no-party affiliation mentioned).

County and legislative district candidates: by petition signed by not less than 2 percent or more than 5 percent of the total vote for party's candidate for same position at last election (judicial and school and tax officials on no-party ballot with petition signed by same percentage of total vote without party affiliation); plus filing fee of $3. Some offices such as surveyors, constables, etc., require no filing fee. All petitions must be accompanied by a candidate's signed affidavit of eligibility to hold office. Petitions may be filed *for* a candidate *with* affidavit signed for him by five qualified voters, but must be accompanied by the candidate's written permission. Writeins and printed stickers may be used for names not on the ballot.

Ohio

By declaration of candidacy, plus petition, plus filing fee. The filing fee is one-half of 1 percent of a year's salary for the office, but not more than $50. No fee is required for party office. The petition signatures required are:

Statewide office	1,000 to 5,000	the top limit must not be exceeded
Any party of state (congress, etc.)	100 to 500	
County office	100 to 500	
Less than county	5 to 25	

Writeins are allowed on ballot.

If there is no contest, the candidate is declared nominated without appearing on the primary.

Oklahoma

By filing a declaration of candidacy stating pertinent facts such as party, office sought, race, address, etc., and accompanied by a sworn affidavit signed by two party members attesting to the truth of the declaration. If only one candidate files in the primary for an office he is declared the nominee and his name does not appear on the primary ballot.

Oregon

By petition *or* by declaration of candidacy and filing fee: Petition: by signing an affidavit petition which must be accompanied by petitions signed by qualified party members equal to 2 percent of the party vote, but not more than 1,000 signatures are required for statewide office,* nor more than 500 for any other office. Petitions for more than precinct office must be signed by party members of a percentage of the total precincts represented by the office. A party member can sign any number of petitions for the same office.

Declaration: by filing a declaration of candidacy and a filing fee as follows:

U. S. Senator	$150	State legislature	$10
State office	100	County office	20
Congress	100	National committee	
Circuit judge	50	National party delegate	15
		District committee office	5

Writeins allowed on ballot.

(* From at least one-tenth of the precincts in at least seven counties.)

Pennsylvania

By petition, affivadit of candidacy, and filing fee.

	Signatures of party members required	Filing fee required
U. S. Senators, President in preference primary	100 each, 10 counties;	$50
State office	100 each, 5 counties;	50
Congressmen, state senators	200 signatures	35
State representatives, county, city offices	100 signatures	25
Magistrate in city of 1st class (Philadelphia)	3,000 signatures	(leg.) down to $1.

Rhode Island

a. By filing a Declaration of Candidacy during the last 10 days of July before a regular primary (all candidates).

b. The party committee decides which candidates it will endorse, and files the list of endorsed candidates with the appropriate local board or the secretary of state.

c. The local board, or the secretary of state, depending on the type of office sought, prepares nomination papers for the use of candidates in securing signatures. All candidates endorsed by one party committee for the different offices may be combined on one nomination paper, but unendorsed candidates may not combine on one paper.

d. The nomination papers must be signed by qualified party voters, as follows:

U. S. Senator, or governor	at least 1,000 signatures
Other statewide offices	at least 500 signatures
Congressional office	at least 500 signatures
State senator	at least 100 signatures
State representative	at least 50 signatures

Other offices, local, etc., in proportion.

e. On the primary ballot, the endorsed candidate for each office is placed first and starred (*). If there is only one candidate filed for an office he is automatically nominated and his name is not placed on the primary ballot. If there should be no contest for any office to be voted on, either for nomination or party election, on the ballot of any voting district, no primary would be held in that district, nomination and party election being automatic.

South Carolina

By a pledge, signed by the candidate and filed with the state or county committee and by payment of assessments determined by the committees.

If there is no contest for an office, the one candidate is declared nominated without appearing on the primary ballot.

Writeins are permitted.

South Dakota

By petition signed by not less than 2 percent or more than 5 percent of the qualified party members of the area represented by the office, the percentage to be based on the party vote for governor in that area at the preceding gubernatorial election. The petition must be accompanied by a declaration of candidacy signed by the candidate. If no contest, the single candidate for an office is declared nominated. No provision for writeins.

Tennessee

By filing with the state or county primary election commission of the party by nominating petition signed by at least 25 qualified voters of the party. The state primary election commission of each party is the state executive committee of the party, elected at the primary and serving for two years until the next primary. It is their job to pass on all nomination petitions for statewide office for their party, and to appoint the county primary boards for each county of the state, for their party. The county boards thus appointed pass on nominating petitions for congressmen, state legislators, etc.

Texas

By written request signed by the candidate, or signed for his candidacy by 25 qualified members of his party; plus a filing fee as follows:

U. S. Senator, Congressmen, statewide offices
up to 5 percent of one year's salary
State senators and representatives
$1 to $100 depending on population of counties concerned.

Utah

By preprimary conventions at every level (state, congressional, judicial, legislative, county, precinct) which makes designations. The procedure is as follows:

1. At least 20 days before whichever convention is concerned, candidate must file "declarations of candidacy," or acceptance of candidacy if his name is filed by signatures of 25 party members; and must pay filing fees equal to one-fourth of 1 percent of the salary for a year but not less than $5 except for precinct office.

2. The convention votes by secret ballot on all candidates for an office who have filed. There is one vote taken on candidates for each office. The two candidates receiving the highest votes from the convention are placed on the primary ballot; the rest are eliminated (if only one candidate has declared his candidacy for an office, he is nominated without the need for either convention or primary voting). No candidate not thus endorsed by the convention can appear on the primary ballot.

Vermont

By petition signed by qualified members of the party as follows:

For governor, U.S. Senators, Congressmen and all statewide offices 500
For all county offices, at least 2 percent of total votes cast for candidate receiving highest vote in preceding leection.
For state representative, not less than 3 percent of total votes cast for state representative in preceding election, in the district.

If petitions are not acceptable, time is allowed for supplemental petition filing.

Writeins allowed.

Virginia

By filing a declaration of candidacy; by complying with the rules of the proper committee of his party; by filing with the declaration a petition signed by qualified members of his party:

For U.S. Senator, Congressman, or any state office ..... 250 signatures
Legislature, city and county office ..... 50 signatures

And by paying a filing fee equal to 2 percent of one year's salary for the office or a sum set by the proper committee if the office is paid all or partly by fees or $1 if the office is unpaid.

Washington

By filing a declaration of candidacy and paying a filing fee as the September primary, and from 45-60 days preceding other primaries such as municipal; and by paying a filing fee as follows:

For precinct job with no salary	$1
For office with salary up to $1,000	$10
For office with salary over $1,000	1 percent of one year's salary.

Declarations of candidacy for party primaries must state party; for nonpartisan primaries may not state party.

West Virginia

By filing a Declaration of Candidacy and paying a filing fee as follows:

Candidates for U.S. President and Vice President, Senate and Congress, governor and all other statewide offices, judges of a circuit court: A fee equal to 1 percent of the annual salary of the office.

State senator	$20
State house	$10
County offices	1 percent of annual salary, at least $5.

Other offices in proportion.

Wisconsin

By petition signed by members of the party as follows:

For statewide office—at least 1 percent of voters of party nor over 5 percent in at least six counties, with 500 minimum for smallest party and 5,000 maximum for largest.

For Congressman—at least 2 percent of party voters in at least half of counties in congressional district, with 50 minimum, 2,000 maximum.

For county—minimum possible 5 signatures, maximum allowed 5000. Write-ins allowed.

Wyoming

By "petition" (declaration of candidacy) plus filing fee of $20 for any office above the county level, $10 for county office or less, no fee for precinct office.

IS THE OFFICIAL PARTY CHOICE INDICATED ON THE BALLOT?

Alabama

There is no official party endorsement of particular candidates. Names are rotated on the primary ballot, with each candidate for nomination to an office placed first an equal number of times.

Arizona

No. Names rotate in order on the ballot.

Arkansas

No. Placed on the ballot is determined by lot at a public meeting of the commission of elections.

California

No, but incumbents running for reelection are placed first for each office and named as such; other names rotate. Each name is accompanied by a statement of occupation or current office.

Colorado

Yes. The candidates certified by the party assemblies head the list, the candidate receiving the highest number of assembly (convention) votes for each office listed first for the office, the next highest second, etc. Candidates by petition are placed at the end of the list for each office.

Connecticut

Yes, party-endorsed names come first, marked with *. Others follow alphabetically.

Delaware

No. Candidates who have notified their party of their candidacy are placed on the ballot alphabetically under each office. The ballots are prepared by the party.

Florida

No.

Georgia

No.

Idaho

No. Names are arranged alphabetically for each office.

Illinois

No. State candidates are listed alphabetically; all others in order of filing.

Indiana

No. Names are rotated on the ballots so undue advantage is not given to any candidate.

Iowa

No. Names rotate on ballot.

Kansas

No. Candidates' names are rotated on the primary ballot, without preference.

Kentucky

No. Names of statewide candidates are rotated on the primary ballot; others are arranged by lot.

Louisiana

No. Names are arranged alphabetically for each office.

Maine

No. Names are arranged on the ballot in alphabetical order under each office.

Maryland

No. Names of candidates are arranged alphabetically on the ballot.

Massachusetts

Yes, endorsement on the ballot for certificated candidates. Others alphabetically.

Michigan

No. Names are rotated on the ballot; no preferred order.

Minnesota

No. Names are rotated on both the party and the nonpartisan ballot.

Mississippi

No. Names are arranged alphabetically.

Missouri

No. Names of candidates for an office rotate on the ballot, for both party and nonpartisan ballots.

Nebraska

No. Candidates endorsed by preprimary state and congressional conventions were so identified on primary ballots in four state elections until repealed in 1953.

New Hampshire

No. Names are rotated on the ballot.

New Jersey

No. Position under each office is determined by lot. However, each candidate's name may be followed by a statement of not more than six words stating his platform, political policy, etc. A group of candidates representing a policy or faction within the party may request that they be grouped together on the primary ballot, with a common statement indicated by them printed opposite their names. No two groups may use the same statement.

New Mexico

Yes, the ballot indicates which are the candidates designated at convention.

New York

No. Order of names on the ballot is determined by lot, except where names are grouped on one petition, in which case they appear in the same order.

North Carolina

No.

North Dakota

No, there is no official endorsement. Names are rotated on the primary ballots.

Ohio

No. Names appear on the ballot in rotation.

Oklahoma

No. Names rotate in position on ballot so that no candidate has an advantage because of place on ballot.

Oregon

No. Names are rotated on the ballot—no preference.

Pennsylvania

No. Position on the ballot is determined by lot.

Rhode Island

Yes, by position and by asterisk.

South Carolina

No.

South Dakota

No. Names are placed on ballot in order determined by lot.

Tennessee

No. Names of candidates are listed alphabetically for each office.

Texas

No. Position on ballot is determined by lot.

Utah

Only the two candidates for an office endorsed officially by the party convention can appear on the ballot, so the fact of being on the ballot implies endorsement.

Vermont

No. Contesting candidates are listed on the ballot alphabetically.

Virginia

No.

Washington

No. Names are rotated on ballot, for each office. All candidates of all parties are on the same ballot (blanket ballot) with all candidates for each office grouped together, each name followed by party affiliation. Nonpartisan candidates for nonpartisan offices are also on the same ballot, without party label, in a separate section.

West Virginia

No, endorsement is not indicated. Names are rotated on the ballot.

Wisconsin

No. Names are rotated on the ballot.

Wyoming

No. Names are placed under each office alphabetically.

WHO IS ELIGIBLE TO VOTE IN THE PRIMARIES?

Alabama

Registered voters who are party members; closed primary. Registration is permanent. Payment of a poll tax is required for voting.

Arizona

Closed primary, available only to party members. Those not enrolled with a party may vote only for names on the nonpartisan ballot.

Arkansas

Closed primary. Voter must have paid poll tax (there is no registration) and be a member of the party.

California

Closed primary; only registered and enrolled party members. All qualified voters may vote the nonpartisan ballot.

Colorado

Closed primary. Only qualified party members may vote in the primary.

Connecticut

Closed primary: only enrolled party members may vote.

Delaware

Closed primary. Only those listed on the "voting books" for primary voting may vote. When a person votes in the primary this information is entered in the voting book, and he may not then vote in the primary of the other party.

Florida

Enrolled party members, i.e., a closed primary.

Georgia

Voters must be registered (PPR), and affiliated with the Democratic Party (closed primary).

Idaho

Any qualified elector . . . open primary. Ballots are divided by perforations between party tickets. Voter tears off ballot of party he wishes to vote and returns others unused. Nonpartisan candidates are in separate column, to be voted by all voters.

Illinois

Any eligible voter who has not voted in the primary of another regular political party within 23 months, and who declares himself affiliated with the party by so stating to the primary judges at the primary election. If registration is required in his area he must be registered.

Indiana

Closed primary, but every registered voter is eligible. Registration is permanent and personal, statewide, with registration by mail allowed in certain instances.

Iowa

Closed primary, available only to party members.

Kansas

Closed primary; only qualified party members may vote in primary.

Kentucky

Only qualified party members; closed primary. Voters must be registered and enrolled in a party.

Louisiana

Closed primary: only qualified voters, registered at least 30 days before the primary, and party members, may vote.

Maine

Only qualified voters who are members of the party may vote: closed primary.

Maryland

Closed primary. Only registered voters are eligible and they must be enrolled with the party in whose primary they wish to vote. Permanent personal registration as used in Baltimore, and various counties.

Massachusetts

Closed primary, available only to enrolled party members.

Michigan

Every registered voter: open primary. Registration permanent personal.

Minnesota

In permanent registration areas, any registered voter. Elsewhere, (generally in villages and towns under 7,000) any one who is known to be qualified as to residence, etc. Open primary.

Mississippi

Closed primary. Only registered members of party who have paid their poll tax.

Missouri

Only qualified voters who are registered and are known to be party members may vote in the primary: closed primary. Registration systems vary throughout the state.

Montana

Closed primary; voter must be a qualified party member.

Nebraska

Only qualified voters who are affiliated with the party in whose primary they wish to vote: closed primary. Registration is required of residents of cities over 7,000 population. Permanent registration in counties of over 60,000 population. All qualified voters may vote for nonpartisan ballot.

Nevada

Closed primary for partisan offices; any qualified voter may vote for the nonpartisan offices. Voters must be registered at least 15 days before the primary.

New Hampshire

Only voters whose names appear on the checklist and who are registered (enrolled) with a party.

New Jersey

Closed primary; only qualified party members may vote in a party's primary.

New Mexico

Closed primary: party members only. Registration required. (permanent personal).

New York

Only registered and enrolled voters; closed primary.

North Carolina

Closed primary; only registered and enrolled party members may vote. Registration permanent.

North Dakota

Every citizen who qualifies as to age and residence and has not lost his civil rights. There is no registration for voting in North Dakota. No party affiliation required: Open primary.

Ohio

Closed primary. Voters must be registered and affiliated with a party.

Oklahoma

Every registered and enrolled voter. Closed primary. Registration is permanent, and may in certain circumstances be made by mail. Registration certificate issued to each voter when registered must be presented by voter wishing to vote in any election.

Oregon

Closed primary; only registered and enrolled party members.

Pennsylvania

Closed primary: only registered voters who are enrolled in a party may vote.

Rhode Island

Closed primary: only registered voters who are party members may vote. PPR except that shut-ins may register by mail. New law * * * in effect July, 1952.)

South Carolina

Closed primary: only registered voters who are members of the party may vote in a party's primary.

South Dakota

Closed primary; only registered voters who are members of a party may vote in the primary. Nonpartisan ballots available to all voters.

Tennessee

Closed primary: only registered voters who are members of a party can vote in that party's primary. Registration permanent and personal, statewide.

Texas

Closed primary; only members of an organized political party may vote in the primary. A county tax collector compiles a list of qualified voters who have paid their poll tax and received their poll tax receipt, or have been issued a certificate of exemption; those determine eligibility to vote.

Utah

Open primary; every registered voter is eligible for primary voting, but the voter can vote only one party ticket. Nonpartisan judicial offices appear in a separate column on the ballot.

Vermont

To be eligible, the voter must be listed on the checklist of qualified voters furnished to the polling places. These checklists are posted before the primary and sessions are held for correcting them and adding names of qualified voters.

Virginia

Closed primary. Only qualified voters of a party may vote that party's ballot in the primary. Registration and payment of poll tax is required. A property qualification not exceeding $250 may be prescribed by the general assembly (legislature) for voting in any election for offices other than state legislators to be elected wholly or in part within a county, city, or town.

Washington

Every registered voter is eligible: open primary. Permanent personal registration.

West Virginia

Registered party members: closed primary. Permanent personal registration statewide. Registration by mail permitted in certain cases.

Wisconsin

Every qualified voter: open primary. Registration is required in cities, etc., over 5,000.

Wyoming

Closed primary. Only registered voters may vote. Party affiliation required.

HOW IS PARTY MEMBERSHIP DETERMINED?

Alabama

The party has the right and authority to fix the political and other qualifications for party membership, and to declare who has the right to vote in the primary.

Arizona

By written statement of affiliation at the time of registering. Registration persona; permanent if voter votes once every two years. Party membership may be changed any time up to 30 days before primary or general election.

Arkansas

Each party makes its own qualifications for membership and party membership is not necessarily the only qualification for voting in the primary. For instance, the rules of the Democratic party in Arkansas says:

> (sec. 3a) "Although otherwise legally qualified as an elector, no person shall be permitted to vote in any Democratic primary election hereafter held in this state (1) who is affiliated with the Republican party or any other party opposed to the Democratic party; (2) who has not openly declared his allegiance and sympathy with the Democratic party; (3) who has at the last preceding general election voted against any Democratic nominee; or (4) who voted for any candidate who was not a Democratic candidate."

Also (Sec. 2d.) "Party membership or affiliation shall not be a test or qualification for voting in the Democratic primary elections."

California

By enrolling at the time of registering (registration permanent). Party enrollment may be changed up to 53 days before the primary.

Colorado

By indicating party choice at time of registration (PPR). Change of party membership may be made up to 10 days before the primary.

Connecticut

By enrollment, thus inclusion on enrollment list.

Delaware

Each party makes its own rules for membership.

Florida

By declaring party choice at the time of registering. Registration is permanent in part of the state (the rest have 'periodic' registration) and permanent personal registration will be mandatory in all counties in 1960. Party affiliation appears on official registration certificate given to each registered voter, and may be changed between a general election and 30 days before the next primary.

Georgia

The party determines its own rules for membership. One requirement is that the voter pledge himself to support in the general election all the candidates nominated in the primary of Georgia.

Idaho

Party membership is not required for primary voting.

Illinois

By declaration at the primary; voter's name is then listed in the primary poll books according to party affiliation.

Indiana

By declaration at the primary that the voters supported the majority of the candidates of the party whose primary ballot he requests, at the last general election; or that he intends to do so at the coming election if he did not vote in the preceding one. He may be challenged by a member of the party concerned, on ground of party allegiance, and be required to sign an affidavit as to party support.

Iowa

By declaration at previous primary election, at which time name and party are recorded in pollbooks, from which lists are made to be used at following primary. New voters may vote in primary by declaring party affiliation at time of voting. Change of party affiliation may be made up to 10 days before a primary by filing a written statement with the county auditor, or at the polls election day.

Kansas

Voter declares his party at primary. Lists are made up from primary declarations and are used as check at next primary. After first declaration the voter does not need to make formal declaration again when voting in same polling place. A change in party enrollment may be made up to 30 days before the primary by written declaration filed with the county clerk.

Kentucky

By enrolling in a party at the time of the preceding general election.

Louisiana

By registering as affiliated with the party. The primary ballot also contains a pledge to support all nominees of the party primary in the coming general election.

Maine

A voter may enroll by filing either in person or by mail a declaration of enrollment, signed. Enrollment may be changed any time, but a changed affiliation within six months of a primary disqualifies the voter for that primary.

Maryland

By enrolling when registering. Change of party must be made at least six months before a primary to permit voting in the primary.

Massachusetts

By enrollment; this is done at primary election, and the voting lists used at primaries contain the enrollment from the previous primary, for checking. A voter not enrolled on such voting list enrolls when he asks for the ballot of his party. Change of party or cancellation of enrollment may be made up to 31 days before a primary by appearing in person before a member of the board of registrars and requesting in writing for such change. No changes may be made at the primary.

Michigan

Party membership is not needed for primary voting.

Minnesota

It is illegal to record in any way anything to indicate party affiliation in the primary. Each voter is given both a party ballot (all parties) and a nonpartisan ballot for nonpartisan offices. He marks his choice in one party's column, and also votes the nonpartisan ballot.

Mississippi

Voter must support nominees, be in accord with party for two years; qualifications determined by party. Primary of each party is held in separate polling place, not less than 30 feet apart, but at the same time.

Missouri

By the fact that a person 'is known to affiliate' with the party whose primary ballot he requests, or will make an affidavit or furnish proof that he is affiliated, or swears to support the nominees of the party at the next election.

Montana

By declaration if challenged. Otherwise, he is 'identified' as belonging to a party.

Nebraska

By stating party affiliation when registering; by declaration when appearing at primary election.

Nevada

By affiliation at the time of registration. Registration is permanent, but canceled after failure to vote in any general election, making reregistration necessary. A voter wishing to join a political party, or change parties, may do so up to 45 days before the primary, in which case his previous registration is canceled and he immediately reregisters.

New Hampshire

By 'registering' with a party either at the regular days preceding election for verification of the checklist of all voters, or on the days in advance of the primary set for the purpose of registering with a party.

New Jersey

Registration is permanent; on the signature comparison cards to be used at all elections there is a place for indicating the party whose primary ballot the registered voter requests. Once having voted in one party's primary, a voter cannot thereafter change his party until he

has failed to vote in two subsequent party primaries and then filed an affidavit stating his new party membership. Also, anyone contributing to the campaign fund of one party cannot vote in the primary of another party.

New Mexico

By enrollment when registering. Change may be made any time except the period before primary or other elections.

New York

By marking and signing an enrollment blank—at the time of registering in personal registration districts, or voting in the general election in non-personal registration districts.

North Carolina

By enrollment when registering. At the primary, the voter requests the primary ballot of his party, and this is entered in the primary poll book.

North Dakota

No record is kept of party membership by election officials. Voter requests primary ballot of one party, but no record is kept of his request.

Ohio

By declaration at the primary that the voter supported the candidates of the party at the preceding election. Party declaration noted and used to make up party list.

Oklahoma

By stating party affiliation when registering; this information is entered on the registration certificate. Change of affiliation must be made at least 90 days before the primary, by filing a notice of change with the County Election Board.

Oregon

With permanent personal registration, enrollment is done at time of registering. Enrollment can be changed any time up to 30 days before the primary.

Pennsylvania

By enrollment at the time of (permanent) registration.

Rhode Island

Lists are drawn up from registration cards and posted in public places; showing those eligible to vote in the primary. There are days set for correction of these lists. No one is entitled to vote in the primary of any party who within 26 months has voted in the primary of another party or signed nomination papers for another party; nor can he vote in another party for 26 months after signing nomination papers in one party.

South Carolina

There is a political 'club' in each election district, which meet once each year. Membership in the political club of the party is required for voting in the primary of a party. There is also a pledge required of every primary worker, that he will support the winners of the primary.

South Dakota

By registering (enrolling) with a party when registering to vote. Registration permanent.

Tennessee

In the voting record kept as part of the permanent registration data a record is made when the voter votes in the primary, indicating which party's ballot he votes. The voter may at the primary declare his allegiance to party whose ballot he requests, and state on oath that he expects to affiliate with that party.

Texas

Each primary ballot is printed with a pledge of membership and support of the candidates who win the party primary. When a person votes in the primary, this fact is stamped on the back of his poll-tax receipt or exemption certificate.

Utah

Party membership is not a qualification for primary voting.

Vermont

Although this is intended to be a closed primary, party membership is determined by which ballot the voter requests at the primary.

Virginia

Lists of qualified voters are furnished the judges of the primary of each party participating (three judges for each party).

Washington

Party affiliation is not recorded or asked either when registering or at the primary. Voter may vote for any candidates he desires on the primary ballot, regardless of the party of the candidate; the voter may vote for candidates of more than one party, not of course for the same office. (Blanket primary.) This system is unique with Washington.

West Virginia

By enrollment at time of registering. Change of affiliation may be made in person any time up to 30 days before the primary or other election.

Wisconsin

Party membership is secret. Voter receives all party primary ballots, votes one and discards rest in place provided in voting booth.

Wyoming

Declaration of party recorded as the voter asks for the ballot of his party. First primary vote requires an oath of party affiliation. Party affiliation may be changed up to 10 days before the primary by filling a written declaration of the change with the county clerk.

HOW IS THE WINNER OF A PRIMARY CONTEST DETERMINED?

Alabama

A majority of the vote is required for nomination. If no candidate for an office receives a majority in the first primary, a runoff primary is held in which the two top contenders for the office appear on the ballot.

Arizona

The candidate having the largest number of votes (plurality) wins.

Arkansas

A majority of the votes is required to win.

California

By plurality. However, a candidate who crossfiles and wins in the primary of a party other than his own must also win in his own party's primary to be considered the winner of any primary.

Colorado

Plurality wins.

Connecticut

Plurality: candidate with the highest vote wins.

Delaware

By plurality.

Florida

A majority is required to win. If no candidate has a majority of votes in the first primary, the two candidates with the largest number of votes run in the second or runoff primary.

Georgia

State law requires that the county unit system must be used in determining the winning candidates for all state offices. Congressional candidates may be nominated by either county unit or popular vote, at the decision of the congressional party committee or convention of the state. The county unit system provides that each county shall have twice as many "unit votes" as members of the state house of representatives. The candidate having a plurality in a county wins all the county unit votes. When the "unit votes" from all 159 counties are counted, the candidate receiving a plurality wins except in the case of the governor or U. S. Senator where a majority of the "unit votes" is required.

Idaho

Plurality wins.

Illinois

A plurality wins.

Indiana

By plurality: highest number of votes.

Iowa

The candidate for an office having a plurality wins, providing that he receives at least 35 percent of the total party vote for that office. If no one receives 35 percent of the vote, a subsequent party convention determines the nomination.

Kansas

Plurality wins.

Kentucky

By plurality.

Louisiana

By majority. If a second primary is necessary to determine a majority, it takes place the fifth Tuesday after the first primary. Only the two highest candidates for an office compete in the second primary.

Maine

The candidate with the highest number of votes (plurality) wins.

Maryland

By plurality: the candidate with the highest number of votes wins.

Massachusetts

The candidate with the highest number of votes wins the nomination. (Plurality.)

Michigan

By plurality.

Minnesota

On political party ballots, the candidate with the highest number of votes. On the nonpartisan ballot, the two highest for an office are placed on the general election ballot without party designation, and the final winner is determined then.

Mississippi

A majority is required to win. If no one receives a majority vote for an office in the first primary, the two candidates with the highest votes compete in the runoff primary.

Missouri

By plurality: the candidate with the highest number of votes wins.

Montana

By plurality.

Nebraska

The candidate with the largest number of votes wins—plurality.

Nevada

By plurality.

New Hampshire

By the highest number of votes: plurality.

New Jersey

By plurality.

New Mexico

Plurality: highest vote wins.

New York

By plurality: candidate with the highest vote wins.

North Carolina

A majority of the votes is required to win. If no candidate for nomination to an office wins a majority on the first primary, a runoff primary will be held if requested by the next highest candidate. If such a request is not made, the nomination goes to the highest candidate without a runoff primary being held.

North Dakota

Plurality (highest number of votes) wins. However, no candidate can be declared nominated by primary vote unless he receives at least as many votes as his petition required signatures.

Ohio

By plurality.

Oklahoma

Majority of all votes for office is required for nomination. If no candidate for a nomination receives a majority, the two candidates with the highest number of votes run in the runoff primary to determine the winner.

Oregon

Plurality wins.

Pennsylvania

The candidate with the highest number of votes (plurality) wins.

Rhode Island

The candidate with the highest number of votes wins. Plurality.

South Carolina

A majority is required to win. If no candidate receives a majority of the vote for an office in the first primary, a second primary is held in which the two leading candidates for the office compete; if these two tie in the second primary, a third primary is held.

South Dakota

The candidate receiving the highest number of votes (plurality) wins; however, for U. S. senator, congressmen, or governor, the votes received by the highest candidate must be at least 35 percent of the total votes cast by the party for the office. If no candidate for these offices receives 35 percent of the vote, the state convention which follows the primary selects one of the two highest candidates for the office as the party nominee.

Tennessee

By plurality: the candidate with the highest vote wins the nomination.

A majority (more than half) of the votes cast for the office are required to win. If no candidate receives a majority in the first primary, the two highest candidates for the office compete in the second or runoff primary.

Utah

Since only two names appear on the primary ballot of each party for each office, the candidate receiving the highest number of votes would have a majority of the votes.

Vermont

By plurality: The candidate with the highest number of votes wins.

Virginia

A majority is required for nomination for U. S. senator, governor, lieutenant governor, or attorney general.

A plurality is sufficient for nomination to any other office, unless the city or county committee of the party requires a majority.

Washington

The candidate of each party who has the highest number of votes of the party candidates for the office wins the nomination of his party, provided that he receives a number of votes equal to at least 10 percent of the highest number cast for any candidate of his party in the political subdivision concerned. Two highest in nonpartisan primary run in general election.

West Virginia

Plurality: the candidate with the highest number of votes wins the nomination. (In nonpartisan primaries the two highest run on the election ballot.)

Wisconsin

Plurality, except that all the party's candidates for an office must receive a total equal to at least 5 percent of the average of the party's vote for governor in the two preceding general elections in order to entitle the winning candidate to party nomination. If the 5 percent is not received, the winning candidate goes on the November election ballot as an "Independent," with the party label added (Independent Democrat).

Wyoming

The candidate with the highest number of votes (plurality) wins.

WHO PAYS FOR THE PRIMARY?

Alabama

The county or municipality pays for equipment, polling places, etc.

Arizona

Ballots and expenses are paid by county; municipal election by city.

Arkansas

The party pays for its primaries. Any party may hold primaries at their own expense, or nominate by convention if they choose.

California

Chiefly the county treasury.

Colorado

State, county, city, or municipality, as the case may be.

Connecticut

The municipality.

Delaware

The county or city concerned.

Florida

Expenses are paid by the state or county for state or county elections.

Georgia

The Democratic party.

Idaho

The county.

Illinois

County, city, and other subdivisions share the cost.

Indiana

The county treasury pays the expenses of the primary and other elections.

Iowa

The county, with certain expenses shared by city, town, or municipality.

Kansas

Township and city public funds, apportioned by the county.

Kentucky

The state, city and county.

Louisiana

State, parish, and municipal treasuries.

Maine

The municipalities.

The state pays for the printing of all ballots, their distribution to municipalities, and for all guides to election officials, etc., which may be issued in connection with the primary.

Maryland

Baltimore pays its primary expenses; the various counties pay for primaries in the counties. Filing fees go to Baltimore and the counties.

Massachusetts

State, county, and town.

Michigan

County and city.

Minnesota

The filing fees are divided among the counties concerned; the expenses are paid in part by the state and in part by counties, cities, villages and towns.

Mississippi

The county board of supervisors.

Missouri

The city, county, or state, depending on the primary.

Montana

The county treasury.

Nebraska

The counties pay the expenses of the primaries. The filing fees required of nonpartisan candidates go to defray primary costs.

Nevada

The county or state treasury or both, depending on the offices to be nominated.

New Hampshire

Ballots furnished by secretary of state. Ballot boxes, etc., by cities and towns. Other expenses as determined by law.

New Jersey

State, county, and municipality, share costs.

New Mexico

The filing fees are used to pay primary expenses; any deficit is paid by the county.

New York

New York City pays for its elections; elsewhere the cost is shared by the units (town, city, county) using the same primary in proportion to the number of candidates for each unit on the ballot as a whole.

North Carolina

The county treasuries.

North Dakota

County funds pay for primary. Filing fees go to help defray primary cost.

Ohio

Paid from the county treasuries.

Oklahoma

The state pays certain expenses in statewide primaries, the counties pay the rest.

Oregon

State and county treasury.

Pennsylvania

County and city treasuries.

Rhode Island

State and local expenses paid as such; statewide nomination papers prepared and furnished by secretary of state; most other expenses by local boards.

South Carolina

The county committee of the party.

South Dakota

The county treasury.

Tennessee

The counties pay the expenses of the primary.

Texas

The county committee of the party makes an estimate of the cost of the primary. This estimated cost is apportioned among the various candidates for nomination on district, county, and precinct levels. This apportionment determines the filing fee.

Utah

The state and county treasuries.

Vermont

State, county and town each pay certain expenses.

Virginia

The counties and cities. Fees received from candidates go into county and city treasuries.

Washington

Primary expenses are paid chiefly by county and city.

West Virginia

Filing fees go to counties, and counties pay expenses of primaries.

Wisconsin

The unit of government (city, county, etc.) concerned.

Wyoming

Expenses are paid by the county treasury.

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ASSEMBLY INTERIM COMMITTEE REPORTS
1957-1959

VOLUME 8 NUMBER 5

REPORT OF THE

Assembly Interim Committee on Governmental Efficiency and Economy

TO THE 1959 GENERAL SESSION OF THE CALIFORNIA LEGISLATURE

House Resolution No. 220, 1957

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Published by the
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OF THE STATE OF CALIFORNIA

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Minority Floor Leader

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COMMITTEE LETTER OF TRANSMITTAL

ASSEMBLY CHAMBER, STATE CAPITOL
SACRAMENTO, CALIFORNIA, MARCH 13, 1959

HON. RALPH M. BROWN
Speaker of the Assembly
MEMBERS OF THE ASSEMBLY
Assembly Chamber, Sacramento, California

GENTLEMEN: Pursuant to House Resolution No. 220, 1957 Session of the California Legislature, your Assembly Interim Committee on Governmental Efficiency and Economy submits its report covering its functions and activities during the 1957-59 interim.

The work of the committee was divided among various subcommittees and each submits its own report and recommendations, if any, based upon facts accumulated at the various hearings.

Respectfully submitted,

RALPH M. BROWN, *Chairman*
JOHN A. BUSTERUD, *Vice Chairman*

CARLOS BEE
WILLIAM BIDDICK, JR.
FRANK G. BONELLI
CLARK L. BRADLEY
REX M. CUNNINGHAM
EDWARD E. ELLIOTT
ERNEST R. GEDDES
JAMES L. HOLMES
HAROLD K. LEVERING
FRANK LUCKEL
LESTER A. MCMILLAN
DON MULFORD
HAROLD T. SEDGWICK
ALBERT I. STEWART
GORDON H. WINTON, JR.

REPORT OF THE

ASSEMBLY INTERIM COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

on

ARCHITECTURE, CONTRACTORS, AND CIVIL AND PROFESSIONAL ENGINEERS

LETTER OF TRANSMITTAL

March 13, 1959

HON. RALPH M. BROWN, *Chairman*
Assembly Interim Committee on Governmental Efficiency and Economy
Sacramento, California

DEAR CHAIRMAN BROWN: In compliance with your instructions your Subcommittee on Architecture, Contractors and Civil and Professional Engineers has conducted an extensive inquiry into the practices of certain contractors and subcontractors which have been detrimental to numerous California home owners.

A public hearing was conducted on May 19, 1958, in Buena Park, California, and thereafter a Citizen's Lay Committee carried on further studies, the results of which were conveyed to your subcommittee through liaison with the subcommittee staff.

The report in connection with this subject matter is submitted herewith.

Respectfully submitted,

ERNEST R. GEDDES, *Chairman*
WILLIAM BIDDICK, JR.
JOHN A. BUSTERUD
EDWARD E. ELLIOTT
HAROLD T. SEDGWICK
ALBERT I. STEWART

REPORT OF THE SUBCOMMITTEE ON ARCHITECTURE, CONTRACTORS, AND CIVIL AND PROFESSIONAL ENGINEERS

The magnitude and complexity of the problems referred to your subcommittee for study were strikingly apparent when Assemblyman Richard Hanna presented the facts which led him to introduce Assembly Bills Nos. 1452, 1453 and 1678, popularly known as the "Contractors Trust Fund Act." The statement of the problem by Assemblyman Hanna was as follows:

> "The Lien Law and related statutes as they now operate do not seem to afford the protection originally contemplated and in addition create an inequitable hardship upon the home owner and builder where payment of the original obligation has been made in good faith and subsequent distribution of the moneys to labor, material houses or subcontractors is not made. Further, it would appear that most lien situations arise out of the following undesirable business practices on the part of one or several of the various segments of the construction industry, to wit:
>
> "1. Lending institutions making exorbitant charges for construction money use. Lending institutions failing to assume responsibility for the financial soundness of construction projects and failing to demand reasonable proof of construction accomplishment apace with payments made.
>
> "2. Prime contractors or promoter-builders diverting funds intended for construction payments. Prime contractors or promoter-builders defaulting through faulty business practices arising out of either inexperience, carelessness or original insufficient financing.
>
> "3. Subcontractors rendering misleading or false releases. Subcontractors diverting funds from payments intended to meet their labor or material bills. Subcontractors defaulting through business failures arising out of poor business practices occasioned by negligence, inexperience or original insufficient financing.
>
> "4. Material men relying upon the Lien Law as a credit crutch. Material men who collaborate with subcontractors in rendering false and misleading releases. Material houses failing to accept responsibility for establishment of financial soundness of subcontractors with whom they do business.
>
> "Finally, there is evidence of collusion between various segments of the industry in at least two areas. The first, 'bid shopping' which too often results in underbidding a job and therefore leads to defaults and failures and collusion in overextending credit to unstable contractors or subcontractors in reliance upon the Lien Law.

Assemblyman Hanna told the subcommittee that he had introduced the "Contractors Trust Fund Act" to relieve the ordinary home owner of the hardships which inevitably follow the undesirable business practices which he pointed out. He indicated to the subcommittee that a very searching analysis must be made to determine where the responsibility for the payment of moneys lies. Assemblyman Hanna suggested that the following questions must be answered as a preliminary to the drafting of effective legislation in this problem area.

LENDING INSTITUTIONS

1. Should they have knowledge of the financial responsibility of contractor (borrower)?
2. Should they have responsibility for assuring that enough money is on hand to complete the projects?
3. Should they have knowledge of or responsibility for payment of money to the persons contemplated under the original contract for construction, i.e., contractors, laborers, and material men?
4. Is there any type of control they should be obligated to follow, such as Builder's Control?
5. To what extent are they trying to integrate into the building field?

CONTRACTORS

1. To what extent does the present law assure financial responsibility in a licensee—should or should not this be improved?
2. To what extent at present is the State Contractors Board effective in actually controlling and enforcing present statutes against contractors?
3. What criminal responsibility can we bring to bear on contractors who knowingly divert contract moneys?

   California v. *Holden*—Money coming into the hands of a contractor is his to do with as he sees fit.

SUBCONTRACTORS

1. Should or should not financial responsibility be taken care of through classification of subcontractors and a sliding scale of bonding be required as obligation of contract increases? Should it vary as heavier contracts are taken on? In other words, starting from one job and progressing into several hundred houses, for example.
2. To what extent should they be responsible for labor and materials, particularly in relationship with the prime contractor and lending institution in making statements that payment has been made when actually it has not?

MATERIAL HOUSES

To what extent should they be responsible for the financial status of persons with whom they are doing business?

Following the orientation by Assemblyman Hanna, your subcommittee heard from various witnesses who had been the "victim" of alleged unethical practices by contractors and subcontractors. The subcommittee learned of instances where the home owner was required to pay

twice for a single construction service due to the failure of his contractor to pay either the material men or his subcontractors, or both.

Additional testimony on the problem was received from contractors, subcontractors, and representatives of various construction and material associations. Each witness recognized the problem and acknowledged the complexity which makes its solution difficult.

When the hearing was completed, it was obvious that there was a need for an extensive study and analysis of the problem before any worthwhile recommendations could be made by the subcommittee. Accordingly, Subcommittee Chairman Ernest R. Geddes authorized the continuance of the study of the problem by a citizen's lay committee to be appointed from a list of persons indicating an interest in developing a solution.

A lay committee was organized consisting of the following members: Henry B. Ely, Secretary of the Construction Employers Council; J. D. Harris, Vice President and General Counsel of the Fluor Corporation, Ltd.; Richard Howlett, Vice President of the Title Insurance and Trust Company; Leo E. Hubbard of the Building Material Dealers' Credit Association; Gardiner Johnson, Attorney at Law; Walter W. Keusder of the Home Builders Council; J. D. Mack of the Construction Industry Legislative Council; Warren R. Mendel of the Engineering and Grading Contractors Association; P. J. O'Donovan, Construction Industries Department of the Los Angeles Chamber of Commerce; Claud F. O'Hara of the V. F. W.; William O'Sullivan of Am-Vets; H. Cedric Roberts, Vice Chairman of the Contractors State License Board; Harold A. Slane, Attorney at Law; R. K. Van Anda of the Anvil Building Material Company.

The Citizen's Lay Committee, under the chairmanship of P. J. O'Donovan, has been very active to date and plans to function as long as it is necessary in order to find the solutions to the problems which were presented at the hearings of your subcommittee.

Generally speaking, the Citizen's Lay Committee intends to investigate the following subject matters:

1. Protection of the public and industry through proper measures in the California codes to avoid diversion of funds and materials.
2. Protection of the public and the industry by amendment or repeal of the lien law.
3. Protection of the public and industry by amending the Contractors License Law and other sections of the codes to insure increased responsibility of licensed contractors.
4. Protection of the public and industry from unwarranted and excessive costs of financing.

The Citizen's Lay Committee is aware of the fact that many of the problems presented cannot be resolved immediately. It is the intention of the committee to conduct further studies with the ultimate object of drafting clear and effective legislation.

CONCLUSIONS AND RECOMMENDATIONS

The problems presented to your subcommittee require additional and continuing study. A solution by legislation cannot be anticipated at the 1959 Session of the Legislature. However, important strides can be taken by the introduction of approprite legislation tailored to fit a long-range program which will lead ultimately to the solution of many of the problems which have come to the attention of the subcommittee.

It is the recommendation of your subcommittee that Assembly Bills Nos. 1452, 1453 and 1678, which have been designated as the "Contractors Trust Fund Act," be re-examined, re-evaluated and redrafted if that type of legislation will conform to a long-range plan for corrective legislation. The home owner is in need of immediate relief and your subcommittee recommends immediate legislative action.

REPORT OF THE

ASSEMBLY INTERIM COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

on

CREATION OF THE CALIFORNIA INTERCOLLEGIATE ATHLETIC COMMISSION

LETTER OF TRANSMITTAL

March 9, 1959

HON. RALPH M. BROWN, *Chairman*
Assembly Interim Committee on Governmental Efficiency and Economy
Sacramento, California

DEAR CHAIRMAN BROWN: Pursuant to your instructions, your subcommittee conducted an extensive inquiry into the operations of intercollegiate athletic activities in California for the purpose of ascertaining the necessity and desirability of establishing a California Intercollegiate Athletic Commission.

Your subcommittee wishes to acknowledge the very fine co-operation of the Pacific Coast Conference and its Director, Victor O. Schmidt, in making the records of their office available to the subcommittee staff.

Your subcommittee hereby submits its report to the full committee for its consideration.

Respectfully submitted,

FRANK G. BONELLI, *Chairman*
CLARK L. BRADLEY
EDWARD E. ELLIOTT
HAROLD K. LEVERING
GORDON H. WINTON, JR.

REPORT OF THE SUBCOMMITTEE ON THE CREATION OF THE CALIFORNIA INTERCOLLEGIATE ATHLETIC COMMISSION

The imposition of substantial fines and sanctions on the University of California at Berkeley, the University of California at Los Angeles, and the University of Southern California, by the Pacific Coast Conference for alleged violations of the Conference Code, sparked the introduction of Assembly Bill No. 2275 by Assemblyman Charles Wilson at the 1957 Regular Session of the Legislature. The bill provided for the creation of a California Intercollegiate Athletic Commission. It was the hope of the author that such a commission could act to prevent a reoccurrence of the circumstances whereby penalties and/or sanctions could be imposed upon colleges and universities supported wholly or in part by public funds without being subjected to any degree of control by the public or their authorized representatives. Your subcommittee carefully considered all the factors relating to the necessity or desirability of creating such a commission.

The organization and operation of the Pacific Coast Conference was the chief target of inquiry by your subcommittee inasmuch as it imposed the fines and sanctions referred to above.

Pacific Coast Conference Commissioner Victor O. Schmidt testified that certain conference rules had been violated by member schools and that after investigation by his office penalties and sanctions were imposed. He denied the existence of any irregularities in the conduct of the Pacific Coast Conference or its investigations and felt the penalties and sanctions imposed were justified. Mr. Schmidt stated that the Pacific Coast Conference had been a ladder of success for member schools and vigorously opposed the creation of a California Intercollegiate Athletic Commission.

A number of witnesses criticized various aspects of the conference operation and shared the view that the penalties and sanctions imposed by the conference were excessive, unfair and unwarranted.

The comments of the late Harry "Red" Saunders, head football coach of the University of California at Los Angeles, perhaps best summarized the attitude of the critics of the Pacific Coast Conference. He told the subcommittee:

> " * * * I feel that for the past couple of years, anyhow, we have existed in the more or less climate of jealousy and intrigue and venom, and all those things. I really do. And I don't know of anything that has happened to make me believe that this conference is going to work out in its present method. In fact, I said at British Columbia two years ago I thought the Pacific Coast Conference would either have to abandon its archaic, its unworkable code, or abolish football."

President-elect Clark Kerr of the University of California informed the committee that the University of California at Berkeley would withdraw from the Pacific Coast Conference if the conference failed to adopt a five-point program developed by the Board of Regents or if the University of California at Los Angeles was ejected from the conference for failure to meet Pacific Coast Conference schedule commitments through 1960.

Spokesmen from the University of California at Los Angeles and the University of Southern California, indicated their displeasure with the actions of the Pacific Coast Conference. However, they did indicate to the subcommittee that their respective schools did not intend to withdraw from the Pacific Coast Conference at the present time but would attempt to work out their problems within the framework of the conference, if that were possible.

The testimony received by your subcommittee left little doubt that there was considerable dissension and dissatisfaction among member schools with the policies and operations of the Pacific Coast Conference, particularly in connection with the imposition of penalties and sanctions.

Four other conferences were represented at the subcommittee hearings. They were the California Collegiate Athletic Association, the Southern California Intercollegiate Conference, the Western State Conference and the State Junior College Association. Conference officials and representatives of academic institutions which participated in these conferences testified that they were completely satisfied with the present operations of their respective athletic conferences. The subcommittee was interested to learn that none of the four conferences impose fines for violation of conference rules.

No one spoke in support of the proposal to establish a California Intercollegiate Athletic Commission. Even the institutions which were smarting under the penalties imposed by the conference did not favor the establishment of an athletic commission. Other witnesses representing both private and public junior colleges and universities from all parts of the State opposed the creation of a California Intercollegiate Athletic Commisison on the grounds that it would serve no useful purpose. They had experienced no difficulty in the operation of their conferences and felt that there should be no interference from the State. Several suggested that some form of control might be desirable to limit some of the proselyting and recruiting practices of the so-called "big schools," some of which are members of the Pacific Coast Conference.

Joe Verducci, Director of Athletics at San Francisco State College, testifying in opposition to the creation of a state commission declared:

> "The governmental agency has absolutely no business at all in the running of athletic programs in the State of California. We who are in this business feel that the running of an athletic program is, first of all, the responsibility of the president of the university, then the faculty, then the athletic directors of that particular institution. In this room here today, for instance, you have had three people who, between them, represent over 100 years experience in athletic problems. These three people are Mr. Masters, Mr. Toomey and Mr. "Tiny" Hartramft, and certainly

people who are trained educationally and know the educational objectives of the program. We feel these are the people who should control the program of athletics. * * * I feel there may be some elements of the program that might bear scrutiny if they apply, as you seem to indicate they do, through tax exemptions, and that type of thing, but not in the actual running of the athletic program."

Summarily, the creation of an intercollegiate commission was looked upon with very clear disfavor because it was regarded as governmental interference with problems which should be left to school and conference officials for solution.

It was suggested that many of the problems with which the subcommittee was concerned could be resolved by improving the administration of athletics at a conference and institutional level.

Ferron C. Losee, Division Chairman at Los Angeles State College, said:

"I think there is a great deal of meddling with intercollegiate athletics by people who are not qualified to know what is going on. I think athletics has gotten to the point where it has to be administered by people who understand it, by people who have made it a point to become qualified in the administration of athletics, and I think too many people are having too much to say about the administration of the athletics.

"I am not trying to infer that college presidents and college representatives are not people of integrity and well meaning people, but it is difficult for me to understand how an athletic representative can be appointed one year to this position and step in and make important decisions that will influence the administration of the program. I know that in other areas of college life decisions are left up to the experts and I think it should be the same thing in this respect.

" * * * I think that the athletic directors are people of integrity. I really do, and I believe that if the responsibility of the administering of this program was left up to them, and they knew that it was left up to them, and there would be no interferring with them, they would do a pretty good job and they would clear up a lot of difficulty."

Mr. Losee's remarks summarize, with few exceptions, the views of every witness who testified before your subcommittee. In short, he felt it was an administrative problem which could be solved by qualified administrators without the interference of a State agency.

Several months after the hearings of the subcommittee were completed, the University of California, the University of California at Los Angeles, and the University of Southern California, withdrew from the Pacific Coast Conference. Shortly thereafter the remaining member schools voted to disband the conference. It is anticipated that a dissolution will be completed by June 30, 1959.

CONCLUSIONS AND RECOMMENDATIONS

Four conferences now function in California satisfactorily. The Pacific Coast Conference has collapsed and is not expected to operate after June 30, 1959. The necessity for an Intercollegiate Athletic Commission has diminished considerably as a consequence.

It is therefore the recommendation of your subcommittee that the content of Assembly Bill 2275 not be re-introduced at the next session of the Legislature.

REPORT OF THE

ASSEMBLY INTERIM COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

on

CHAVEZ RAVINE

FULL COMMITTEE REPORT

LETTER OF TRANSMITTAL

February 16, 1959

MEMBERS OF THE ASSEMBLY
Assembly Chambers
Sacramento, California

Gentlemen:

Your Interim Committee on Governmental Efficiency and Economy was duly authorized on April 15, 1958, by the Assembly Committee on Rules to take "such action as it deems proper" in connection with the following resolution from the City of Los Angeles:

"WHEREAS, The State of California now owns 36½ acres of land in the center of the Chavez Ravine property planned to be conveyed by the city to Brooklyn National League Baseball Club; and

"WHEREAS, The city has an option on this land; and

"WHEREAS, 22 acres of the 315 acres to be conveyed may later be required for "possible freeway" use; now, therefore, be it

"*Resolved*, That the California State Legislature be invited to designate a committee or committees to conduct an investigation into all aspects of the negotiations between the City of Los Angeles and the Brooklyn National League Baseball Club, Inc., or nominee, including but not limited to:

"1. The purpose for which the city wished to acquire the state land.

"2. Possible interest of the State in land being deeded to private parties which may later have to be purchased by the State for freeway use.

"3. The use of gas tax money to provide access roads to serve primarily land owned by a privately owned, profit-making corporation.

"Presented by: JOHN C. HOLLAND
Councilman Fourteenth District

"Seconded by: EARLE D. BAKER
Councilman Second District

"I HEREBY CERTIFY the foregoing to be a true and correct copy of resolution adopted by the Council of the City of Los Angeles at its meeting held March 26, 1958.

"WALTER C. PETERSON, City Clerk
(Signed) "By A. M. MORRIS
Assistant City Clerk"

Pursuant to the authority granted, a hearing before the full committee was conducted on May 15 and 16, 1958, in the State Building, Los Angeles.

Respectfully submitted,

RALPH M. BROWN, Chairman

CARLOS BEE
WILLIAM BIDDICK
CLARK L. BRADLEY
JOHN A. BUSTERUD
REX M. CUNNINGHAM
EDWARD E. ELLIOTT
ERNEST R. GEDDES
JAMES L. HOLMES
HAROLD K. LEVERING
FRANK LUCKEL
LESTER A. MCMILLAN
DON MULFORD
HAROLD SEDGWICK
A. I. STEWART
GORDON H. WINTON, JR.

REPORT OF FULL COMMITTEE ON CHAVEZ RAVINE

STATE-OWNED LANDS IN CHAVEZ RAVINE

The Chavez Ravine baseball site includes 36.90 acres of state-owned land. The parcel is critically located near the center of the site. Regardless of the Dodger contract, the State of California is required to deliver three acres of the 36.90 acres in question to the City of Los Angeles without charge. This circumstance arose as a consequence of a previous contract with the City of Los Angeles wherein the State of California agreeed to transfer the three acres in exchange for the right of ingress and egress over city property for the purpose of depositing fill upon the state site. The result is that only 33.90 acres of state land must be paid for by the city.

The committee was advised that the City of Los Angeles has an option to purchase the state land. There is no expiration date involved, but it is reported that the city must be in a position to proceed within a reasonable time. To date the land has not been purchased by the City of Los Angeles.

A report relating to the "Status of Land Acquisition Chavez Ravine," dated May 6, 1958, as prepared by Austin M. Hill, Director, Bureau of Right of Way and Land, Department of Public Works, was brought to the attention of your committee. A portion thereof is as follows:

LARGER UNIMPROVED PARCELS TO BE ACQUIRED

Parcel	*Owner*	*Area*	*Appraisal*	*Estimated cost of acquisition*
479A	Weingart & Burns	18.48 acres	$75,000	$120,000
479B	Roman Catholic Bishop	4.60 acres	30,000	40,000
865-867	State of California—Division of Highways	36.90 acres	185,000	170,000
		59.98 acres	$290,000	$330,000
869	Los Angeles City School District (improved)	2.26 acres	250,000	250,000

SMALLER PARCELS—MAINLY RESIDENTIAL

Parcel	*Owner*	*Area*	*Appraisal*	*Estimated cost of acquisition*
84	Estate of Pete Perich	3,450 sq. ft.	$2,750	
217	Michael Moncino	5,900 sq. ft.	1,000	
291	Louis Longoria	3,000 sq. ft.	5,500	
313	Regina Carrillo	5,400 sq. ft.	8,500	
315	Manuel Caranza	5,400 sq. ft.	3,500	
375	John Chaffino	3,924 sq. ft.	2,500	
383	Luis G. Lopez	3,924 sq. ft.	4,750	
395	Remigio Hila	3,924 sq. ft.	6,000	
435	Raymond Contreras	3,924 sq. ft.	9,000	
444	Mrs. Refugio Nava	3,850 sq. ft.	6,000	
473	Francis De Leon	4,050 sq. ft.	9,000	
546	Frano De Leon	9,600 sq. ft.	14,500	
689	Frances Scott	5,620 sq. ft.	9,000	

763	Charlotte E. Hanson	5,800 sq. ft.	7,500	
873	Marty G. Stimson	3,530 sq. ft.	25	
		71,296 sq. ft.		
15		1.64 acres	$89,525	$135,000
24	Total all property	315.86 acres		$2,129,204

Mr. Harold C. McClelland, President of the Old Colony Paint and Chemical Company of Los Angeles, who was requested by Mayor Poulson to conduct negotiations to bring the Dodgers to Los Angeles, told the committee that he anticipated that Parcel 869 (abandoned Palo Verde school building and land of the Los Angeles City School District) could be acquired for $200,000. However, he indicated that the price might be raised by $50,000 by the school district. In fact, there was no assurance that the building and land could be obtained from the school district for less than $250,000. Obviously, the estimated cost of acquisition exceeds the appraisal by 25 percent.

Parcel 479-A was to be acquired for an agreed price of $120,000, or an amount 60 percent in excess of its appraised value. In addition, Parcel 479-B was to be acquired for the sum of $40,000, an amount 33⅓ percent in excess of its appraised value. Fifteen smaller parcels, mainly residential, were appraised for a total of $89,525. The estimated cost of acquisition is $135,000 for a sum 50 percent in excess of the appraised value.

It is very interesting to note that the state-owned land was appraised at $5,000 per acre and negotiations were completed with the State of California Division of Highways to acquire 33.90 acres for $170,000. This purchase price for all practical purposes represents merely an amount equal to the appraised value of the state-owned land.

Many factors, particularly topography in this instance, affect the appraised value of land. The Division of Highways should make certain that the state-owned land in Chavez Ravine is accurately and fairly appraised.

It would appear to be of some importance to determine what factors account for the variance in the appraised value in the parcels of land to be acquired in Chavez Ravine and their ultimate cost of acquisition. It is certainly not a rule of the market place that one who purchases from a governmental agency is entitled to any special advantage. Accordingly, it is incumbent on the Division of Highways to use extreme care in ascertaining a fair price for the 33.90 acres of state-owned land which is to be transferred to the City of Los Angeles.

Another aspect of the contract between the City of Los Angeles and the Brooklyn National League Baseball Club, which merits the very careful attention of the Division of Highways prior to the transfer of any of the state-owned lands, involves the provision therein which requires the city to use its best efforts to acquire the various parcels of land in Chavez Ravine which it does not already own at a "reasonable cost." Several witnesses testified that if the city could not acquire the subject land at a reasonable cost that it would be under no further obligation to acquire it. In such case, the responsibility for acquiring the

acreage needed would fall upon the ball club. If the latter was unable or for any reason not disposed to acquire the additional acreage needed, the luxurious ball park which had been planned would not be built. Under such circumstances, the State of California may find that it transferred land to the City of Los Angeles which it might have retained to its advantage for some future project of another nature. The possibility of transferring the state-owned land in Chavez Ravine on a contingent basis should be carefully explored.

SCOPE OF INVESTIGATION

Testimony was received concerning every aspect of the contract between the City of Los Angeles, a municipal corporation, and the Brooklyn National League Baseball Club, Inc., a New York corporation, from everyone who desired to make a presentation before the committee. Complete television and press coverage enabled every Los Angeles citizen to fully inform himself on the particulars of the contract negotiations in question.

POST-HEARING DEVELOPMENTS

In a referendum election on June 3, 1958, the voters of Los Angeles decided to let the Los Angeles Dodgers build a luxurious stadium in Chavez Ravine by voting approval of Ordinance No. 110204 which authorized and approved the contract between the City of Los Angeles and the Brooklyn National League Baseball Club, Inc., a New York corporation, and further authorized the execution of such contract.

At the time the hearings were being conducted, several taxpayers' suits challenging the transfer of land to the Los Angeles Dodgers organization were before the courts. The lawsuits were based on a clause in the deed by which the City of Los Angeles obtained the property from the Federal Government stipulates that the land shall be used for "public" purposes. On January 13, 1959, the Supreme Court of the State of California unanimously ruled the contract was valid.

The question of the validity of the contract between the Los Angeles Dodgers and the City of Los Angeles appears to have been resolved both by the electorate and the Supreme Court of the State of California. Accordingly, your committee is not inclined to make any findings, conclusions or recommendations at this time.

REPORT OF THE

ASSEMBLY INTERIM COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

on

HORSE RACING

LETTER OF TRANSMITTAL

February 27, 1959

Assembly Interim Committee on Governmental Efficiency and Economy
Sacramento, California

GENTLEMEN: The recodification of the Horse Racing Act was assigned to your Subcommittee on Horse Racing for study. Your subcommittee hereby submits its report to the full committee for its consideration.

Respectfully submitted,

RALPH M. BROWN, Chairman
CLARK L. BRADLEY
REX M. CUNNINGHAM
JAMES L. HOLMES
LESTER A. MCMILLAN

REPORT OF THE SUBCOMMITTEE ON HORSE RACING

The recodification of the Horse Racing Law has been under careful study by subcommittees of the Assembly Interim Committee on Governmental Efficiency and Economy during several interim periods, with the avowed object of bringing the oft amended and disorganized Horse Racing Law up to date.

During the 1955-57 interim period the Legislative Counsel provided the Subcommittee on Horse Racing with a proposed recodification of the Horse Racing Law. The horseracing industry opposed the recodification on the grounds that substantive changes would surely result from any legislative consideration of the existing Horse Racing Law. The industry was, however, most co-operative in offering suggestions and amendments which they felt would make the proposed recodification tolerable.

All of the previous studies on horseracing, and the suggested amendments proposed by the horseracing industry, have been carefully analyzed.

The subcommittee staff has held several conferences with representatives of the horseracing industry. At these conferences the proposed recodification of the Horse Racing Law was thoroughly examined and evaluated. Many of the suggestions offered by the representatives of the horseracing industry were adopted and incorporated into the final draft of the recodification which was prepared by the committee staff at our direction. In view of the length of the draft and in the interest of economy, the subcommittee has determined not to reproduce that document in this report. Copies of the draft are a part of the permanent records of the committee and may be examined at any time by interested persons.

Upon completion, the final draft of the proposed recodification was distributed to the Horse Racing Board, the horseracing industry, horseracing associations and other persons who expressed interest in horseracing. Your subcommittee invited comments, criticisms and suggestions. Two responses were received and were given careful consideration.

CONCLUSIONS AND RECOMMENDATIONS

It is the opinion of your subcommittee that there are no substantive changes in the proposed recodification. Accordingly, your subcommittee recommends that the final draft of the proposed recodification of the Horse Racing Law be introduced at the 1959 Session of the Legislature.

REPORT OF THE

ASSEMBLY INTERIM COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

on

CREATION OF A STATE DEPARTMENT ON HUMAN RELATIONS

LETTER OF TRANSMITTAL

December 30, 1958

HON. RALPH M. BROWN, *Chairman*
Assembly Interim Committee on Governmental Efficiency and Economy
State Capitol, Sacramento, California

DEAR CHAIRMAN BROWN: In accordance with your instructions, your subcommittee has undertaken the study of a proposal by Assemblyman Augustus F. Hawkins relative to the creation of a Department of Human Relations.

Your subcommittee held one hearing on February 17, 1958, in the State Building in Los Angeles. From testimony obtained at the hearing your subcommittee presents herewith its report on the creation of a State Department of Human Relations together with its recommendations.

Respectfully submitted,

(Signed)	LESTER A. MCMILLAN, *Chairman of Subcommittee*
(Signed)	REX M. CUNNINGHAM
(Signed)	EDWARD E. ELLIOTT
(Signed)	ERNEST R. GEDDES
(Signed)	ALBERT I. STEWART

REPORT OF SUBCOMMITTEE ON HUMAN RELATIONS

At the invitation of Chairman Lester A. McMillan, Assemblyman Augustus Hawkins, author of a proposal to create a Department of Human Relations, gave the committee a brief resume of the nature and purpose of the legislation which he believed should be introduced in the Legislature at the earliest possible date. Assemblyman Hawkins testified:

> "I want to explain a little bit the background for the making of this proposal. I want to say first of all that I had in mind not only the extensive amount of discrimination that exists in such basic fields as employment, housing, education, civil service, places of public accommodation, etc., but in addition thereto, I had specifically in mind at this particular time what I think we can refer to as new dangers—dangers which threaten the progress of the State. These dangers have manifested themselves recently in neighborhood disturbances, in school incidents, in bodily assaults, in burning crosses, in riotous acts between organized gangs of teenagers, and in the intensification of the activities of hate groups, comparable to the Southern White Citizens Council. These dangers have been intensified by recent events in the Deep South, by economic recession and by the growth of population in this State, coupled with the changing character of the population itself."

Assemblyman Hawkins advised the committee that in view of the acute nature of the problem he had written to the Governor urging him to give immediate consideration to this subject. Subsequently, he wrote to Honorable Ralph M. Brown of Modesto, Chairman of the Governmental Efficiency and Economy Committee, requesting a hearing. The matter was assigned to your subcommittee.

Assemblyman Hawkins further stated:

> "It was part of my hope that this type of a hearing would indicate the need and would reinforce the Governor's position if he felt he wanted to include this on the special session call. This is one of the purposes, I think, of conducting the hearing at this particular time."

Assemblyman Hawkins cautioned the committee that his proposal should not be confused with the Fair Employment Practices Act. He indicated that both the opponents and the proponents of FEPA are skeptical of the type of legislation which he is proposing. He declared:

> "However, I think the present proposal is not offered as a facsimile or a substitute for a Fair Employment Practices Act, and I certainly don't want anyone to imply that this is giving up the battle for that particular proposal."

Assemblyman Hawkins then explained in detail to the committee the practical results which would follow enactment of his proposal. A

Department of Human Relations would be created and placed under the jurisdiction of the Governor's Office. As such it would be a member of the administrative family of the Governor and directly responsible to him for the proper administration of its duties. It would be the function of that department to assist in the enforcement of civil rights as guaranteed to citizens of the State under existing laws, or under any laws which may be enacted. There are numerous laws in California which directly relate to civil rights. These laws relate to and affect such matters as apprenticeship training, education, insurance and employment, among other things.

There is no doubt that the laws are adequate. However, Assemblyman Hawkins indicated that in many instances they are ineffective:

> " * * * for various reasons, sometimes timidity of state officials, in my opinion, who feel they lack sufficient policy or encouragement. They are not enforced many times because there are individuals in the state service, unfortunately, who are not thoroughly familiar with them, and for other reasons. * * * In other words, we have no effective machinery at the present time for the encouragement or the enforcement of the existing statutes."

Assemblyman Hawkins went on to say that the use of an administrative agency to deal with the problems of discrimination in the various phases of everyday living offers an effective and efficient method of operation. The administrative method is more flexible and adaptable than the strictly judicial or criminal law method. Assemblyman Hawkins suggested that the ordinary person who is discriminated against seldom has the time or funds to pursue a legal remedy. A commission of the type proposed could be instrumental in assisting persons discriminated against with their particular problems by directing them to the agency or official who would be best able to assist them. Satisfactory results could more readily be assured by the follow-up activity which the commission could carry on.

Assemblyman Hawkins outlined several other functions which would be carried on by the commission. He stated it would be the function of the commission:

> " * * * to encourage by appropriate means of development, acceptance of the principles of good citizenship by all persons in the State, with particular emphasis directed toward the inculcation of these principles in persons newly arriving in the State. * * * We can certainly assume that persons coming to this State, whether they belong to minority groups or not, will bring to some extent the patterns of their own states with them, and this, of course, has increased the problem and made the inculcation of certain principles into newly-arrived persons in this State more of a necessity."

Assemblyman Hawkins further stated, that in addition the commission would provide for the existence and effects of discrimination; would recommend, in conjunction with the State Department of Education, a comprehensive educational program in the State designed for the students of the public schools and for others; would provide maps or other helpful materials to the many tourists who enter the State so they may be apprised of the various practical regulations which

govern the everyday activities of everyone in the State; would also provide helpful material to those potential new citizens coming into the State with particular emphasis on the natural resources, the industrial potential, a general picture of California living and most important, an encouraging preview of citizenship free of discrimination.

Milton A. Senn, Regional Director of the Antidefamation League of B'nai Brith, in his testimony before the subcommittee, pointed out that similar commissions on human relations now exist in at least five other states, but have limited enforcement powers. As a result, numerous laws have been enacted to solve the particular problems which the commissions were supposedly able to handle. He felt that if a Commission of Human Relations was created at this time it would not only be ineffective but its creation would materially delay the enactment of legislation needed to cope with the problems of discrimination in employment, housing, education and public accommodations. He said:

> "I think that I want to say to you, and it's perhaps a kind of—it may seem strange to you and it's in a sense kind of difficult for me to say—but I think that in all candor I must say to you that in my opinion this kind of commission for this State needs more careful study than I certainly feel I have been able to give it. * * * I am very dubious about the character of this kind of commission in the absence of legislation to deal specifically with the serious problem which we have in this State. * * * I think that it needs a good deal more study. I think that I would like to compare it with what has been done in other states, and I would like to see the experience in other states, because I don't want to be in the position of seeking the enactment of a piece of legislation, which in my view, is needed in this State to cope with the problems of employment discrimination, housing, education and public accommodations."

Mr. Loren Miller, attorney at law, member of the Legal Committee of the Los Angeles County Conference on Community Relations, Chairman of the Legal Committee of the West Coast Region of the National Association for the Advancement of Colored People, told the committee:

> "My concern here today is with the legal problems that are posed by this bill. * * * At the outset I want to make it plain that both organizations favor legislation which is designed to eliminate discriminatory practices and to help eliminate racial or religious prejudice. The test which we apply to any proposal in the realm of civil rights is that of whether or not it will be effective legislation. Hasty or ill-conceived legislation, in our opinion, which is ineffective, not only does not alleviate the ills at which it is ostensibly aimed but often serves to retard progress by lulling those concerned into a sense of false security."

Turning to the specific proposal before the committee, Mr. Miller suggested that there is considerable doubt whether the proposed Department of Human Relations could function effectively in attempting to curtail discriminatory practices in California. He felt that legislation of another type is required to meet these problems. He said:

"What California needs, in my opinion, is legislation designed to cope with specific discrimination in employment, in housing and in other related fields. Once such laws are on the books it may well be that we will find that there is need for an administrative agency such as existing state commissions against discrimination in other states to coordinate action in all fields and to give direction to the quest for full civil rights."

As the hearing progressed it became apparent that Mr. Loren Miller and Mr. Milton Senn were the only witnesses who opposed the creation of a Department of Human Relations. The remaining witnesses were unanimous in their feeling that the creation of a Department of Human Relations was essential and urgent.

Mr. Bernard S. Jefferson, attorney at law, President of the Los Angeles Urban League, declared:

"I do not quite agree with the attitude of Mr. Miller and Mr. Senn, who spoke before me, relative to waiting for additional study regarding this particular bill. I do not believe that it was intended, and I don't see how any person with any normal degree of intelligence could interpret a bill like this having any intentions or justification of doing away with the necessity of other legislation to establish substantive civil rights which we now lack. I cannot see how any person of sound thinking could believe that the Legislature, or any legislature, could be fooled into thinking that this bill, which would establish a Department of Human Relations, would obviate the necessity of other substantive legislation like the FEPC bill or legislation to cure the evils in housing and to create fair practices with respect to housing. I don't consider that this bill was intended to be any cure-all of anything, and irrespective of whether we had more civil rights legislation or less civil rights legislation than we now have, I believe that it is essential that we have a bill something like this which would establish a Department of Human Relations. I consider that this bill—that its greatest value would be in terms of the educational aspects of it."

The witnesses observed that California is experiencing a tremendous surge in population growth and that it is quite possible that the population of our State will exceed that of New York by the year 1975. A great deal of planning is now underway to meet the problems that continued growth in population will create. In this connection, Mr. Jefferson said:

"Now education as I see it of people who are coming in here—education with respect to civil rights, with respect to developing a fair climate of relationship between the races—is absolutely essential. * * * If this bill were enacted we would start on the road of government doing something about educating people to live together and to respect the rights of each other as American citizens, and that is needed irrespective of other legislation."

Miss Susan Adams, representing the Antidiscrimination Department of the Jewish Labor Committee and the Los Angeles County Central Labor Council, said:

"I am here representing these organizations to support Assemblyman Hawkins' proposal to create a State Department of Human Relations, which would have certain responsibility for the enforcement of existing civil rights statutes. We believe that the need for such a department is increasingly clear as the issues in the fields of civil rights assume increasingly large proportions in America and in California. Each month gives us new evidence of the seriousness of problems in this world field."

Miss Adams made it quite clear to the subcommittee that neither she nor the organization which she represents felt that the establishment of a Department of Human Relations was the final or whole answer. She suggested that other civil rights of legislation would be required to eradicate discriminatory practices in California. The creation of a Department of Human Relations would be helpful in compelling the responsible department of State Government to enforce antidiscrimination laws and enable the public to understand such laws. Of Assemblyman Hawkins' proposal, she said:

"We believe that the agency proposed by Assemblyman Hawkins, which will carefully organize a program of public understanding of these provisions of the law, is needed as a first step. We do not think that this is a final step. * * * We do feel, however, that this is a good first step and we should like to support it, and we should like so to recommend to your committee."

Mr. Fred Takata, Southern California Regional Director of the Japanese-American Citizens League, speaking in favor of the proposal, read a letter to the subcommittee from Dr. Roy Nishika, National President of the Japanese-American Citizens League:

"The Japanese-American Citizens League, with 86 chapters throughout the United States and 50 chapters in the State of California, heartily endorses the establishment of a Department of Human Relations in the State of California. We feel that this step will pave the way for better understanding, tolerance and good will among the various people of this great State, and the establishment of such a department will aid in the promotion of greater justice, fair play and equality of opportunity. We believe that the study and promotion of better human relations is not only desirable, but is a necessity in today's space age. With the peace of the world held in the balance, today's great need is for more understanding, tolerance and good will among all peoples. By the enactment of legislation creating a Department of Human Relations, the great State of California can set an example not only for the rest of the states, but for the world as well.

"We respectfully, and yet urgently, ask that the members of this committee, as well as the members of the State Legislature, and the Governor give this matter their early and favorable consideration."

(Signed) ROY M. NISHIKA
National President
Japanese-American Citizens League

Several witnesses who for one reason or another did not have an opportunity to study the proposal of Assemblyman Hawkins in detail, appeared before the subcommittee to express their deep interest in the subject matter.

Mr. Anthony P. Rios, President of the Community Service Organization, representing the eight county chapters and 12 city chapters in the California district, expressed the interest of his organization in the proposal relating to the creation of a Department of Human Relations. He indicated that he will urge his organization to go on record in favor of the proposal.

Mrs. Martha Tripp, Young Women's Christian Association of Los Angeles, told the committee that the organization that she represents seeks actively at all times to do everything which will benefit human relations and requested that her organization be advised of the progress of this matter.

Miss Dorothy Bliss, Women for Legislative Action, speaking for Women for Legislative Action, an organization composed of 500 women, testified:

> "We are deeply interested in the formation of a State Department of Human Relations. We know through studies that various members of our group have made that grave problems exist in the area of human relations in this State. * * * An enlightened approach to the critical problem of our age, mainly that people of all races, creeds, and colors may live together in peace, must be tackled at a state level. We believe that the establishment of a Department of Human Relations is a necessary first step in the right direction."

Dorothy Marshall, Past President of Women for Legislative Action, sponsor-member of the National Conference of Christians and Jews, speaking only for herself told the committee that many people could benefit from the educational function of a Department of Human Relations. Such a program would expose many people to the problems which minority group members face every day and of which members of the majority race know very little.

She said:

> "I would like to say that I very much am in favor of Mr. Hawkins' proposal. I am sure he agrees that it is not supposed to be a perfect piece of legislation. But it seems to me it would be a definite step forward, and I'm sure that for people who are sincerely interested in this field, it would be a great encouragement to think that among our legislators and even up to the Governor's office himself, we would now have an agency which we could at least fall back on, with which we could discuss things and from which we could hope to get educational material."

Mr. Sigmund Aerowitz, Educational and Public Relations Director of the International Ladies Garment Workers Union, told the subcommittee:

"We feel that with the growth of California, with the fact that we do not at this time have a homogeneous population, but rather people who have come from all parts of the country, of all backgrounds, it's more essential in this State than in any other state that there be a definite governmental approach to the problem of getting the people to work together, to live together, to cooperate with each other. Both in the field of education and State Department of Human Relations and in the field of legislative action in the matter of law enforcement it is very essential that we have a department, and our organization very wholeheartedly supports this bill and urges favorable consideration."

Mr. Al Green, a member of the Progressive Democratic Club, 62d District, in a brief statement to the subcommittee favored legislation creating a Department of Human Relations.

The testimony presented to this subcommittee indicated that there was a great deal of enthusiastic support of Assemblyman Hawkins' proposal to create a Department of Human Relations. It is interesting, also, to note that the two witnesses who spoke opposing the creation of such a department at this time, nevertheless recognized the need for it.

Your chairman entertained a motion by Assemblyman Elliott that the subcommittee go on record as requesting the Governor of our State to place the general subject matter of this bill on special call at the next session of the Legislature during the month of March and that the subcommittee also recommend that the main committee follow in the subcommittee's action. After the second of Assemblyman Cunningham, the motion was unanimously passed.

In accordance with the above motion the subject matter of Assemblyman Hawkins' proposal was transmitted to the Governor of the State of California. No action was taken thereon and consequently such matter was not placed on the special call.

CONCLUSIONS AND RECOMMENDATIONS

Your subcommittee believes that the statements and testimony of the witnesses very graphically point out the urgent need for a Department of Human Relations to undertake the important task of reducing discriminatory practices in California.

Accordingly, it is the conclusion of your subcommittee that the proposal of Assemblyman Hawkins, calling for the creation of a Department of Human Relations, is necessary and will be most helpful in assisting all of our people to live together respecting the rights of each other.

REPORT OF THE

ASSEMBLY INTERIM COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

on

INTERIOR DECORATORS

LETTER OF TRANSMITTAL

March 10, 1959

HONORABLE RALPH M. BROWN, *Chairman*
Assembly Interim Committee on
Governmental Efficiency and Economy
Sacramento, California

GENTLEMEN: In accordance with your instructions your subcommittee has conducted a thorough inquiry relative to the necessity or desirability of licensing interior designers and decorators.

In order that all interested parties might present their views, a public hearing was held in Los Angeles on November 27, 1957. Subsequently, on February 14, 1958, a hearing was conducted in San Francisco.

The subcommittee hereby submits its report to the full committee for its consideration.

Respectfully submitted,

JOHN A. BUSTERUD, *Chairman*
CARLOS BEE
FRANK LUCKEL
A. I. STEWART

REPORT OF THE SUBCOMMITTEE ON INTERIOR DECORATORS

California does not require persons rendering decorating or designing services to be licensed. On January 21, 1957, Assemblyman Montivel Burke introduced Assembly Bill No. 2293. It provided for the regulating and licensing of interior designers and decorators; created a State Board of Interior Designers and Decorators, prescribing their powers and duties; and made an appropriation therefor. The bill provided in part as follows:

> "9910. On and after January 1, 1958, no person shall hold himself out as an interior designer or decorator, or engage in the practice or service of interior designing or decorating without first obtaining a license from the board established by this chapter.
>
> "9911. The practice of interior designing or decorating within the meaning of this chapter is such practice that holds out to the public the furnishing of advice, counsel and guidance with respect to the design, decoration or arrangement of the interior of rooms or buildings, or the selection of furnishings and appointments thereof, as an interior designer or decorator.
>
> "9912. Interior designing or decorating service within the meaning of this chapter is any person which holds himself out to the public as an interior designer or decorator, and engages in the business of an interior designer or decorator, either solely or in conjunction with other business operations or performing or offering to perform services as described in Section 9911.
>
> "9913. Any person who uses in any sign, advertisement, or otherwise, the words 'interior designer or decorator,' or any other term or terms or letters indicating or implying that he is an interior designer and decorator, or that he practices or holds himself out as engaging in the practice of interior designing and decorating, as defined in this chapter, without having at the time of doing so a valid unrevoked license as required by this chapter, is guilty of a misdemeanor."

The problem before your subcommittee for study and determination was whether or not interior decorators should be licensed under the terms of Assembly Bill No. 2293 or any other bill.

Each of the principal arguments in favor of licensing interior decorators presented to your subcommittee was carefully analyzed. They were in substance as follows:

(1) The consumer, individual, and the furniture retailer would be protected against growing unethical practices in the home furnishings field.

(2) Any hardships and abuses upon the consumer as a result of misinformation, general incompetence and lack of training by persons representing themselves to be qualified interior designers and decorators would be eliminated.

(3) Costly errors committed in the selection and presentation of woods and materials by persons who are not qualified by virtue of their lack of knowledge would be prevented.
(4) Errors on the wholesale level by incompetent and unqualified decorators who make mistakes with merchandise which is prepared on a custom basis could be eliminated.
(5) A group of professional individuals the public may recognize as qualified interior designers and decorators would be established by law.
(6) Licensing would lead to the establishment of professional standards.
(7) Misrepresentation to the public to the effect that they are receiving professional decorating advice when, in fact, they are not, would be prevented.
(8) The "small" citizen would be able to have the same kind of protection that large organizations insist on to protect themselves on their construction and decorating projects, if the law will not at least provide the public with the option to choose between a licensed decorator and any other decorator they may wish have do their work.
(9) Wholesalers who have practically no means of qualifying people to whom they sell would be protected. Anyone with a retail license can call himself an interior decorator and require the wholesaler to sell to him.
(10) The interior designer or decorator is a professional person and renders a professional service and should be licensed.

The witnesses who opposed the licensing of interior decorators gave the following reasons for their opposition:

(1) The inherent right of furniture retailers and their sales personnel to counsel, advise and assist customers in selecting home furnishings would be removed.
(2) Licensing of every person furnishing advice on decoration of rooms, whether he be employed solely as an interior decorator or furnish decorating advice in conjunction with other business operations would be required.
(3) Almost every customer that comes into a store today asks for advice. The personnel must be able to give on-the-spot advice. The public is well-informed and cannot be deceived for long if improper advice is being given.
(4) Competent professional interior decorators and designers are easily identifiable without the necessity of being licensed. The files of our courts and the Better Business Bureaus do not contain any history evidencing malpractices by salespeople assisting the public in the decorating of their homes.
(5) The administration and supervision of all furniture stores and their personnel selling home goods would be turned over to the California State Board of Architectural Examiners and architects are not necessarily versed with the problems involved in the operation of furniture or home goods retail stores.

(6) Interior design is a profession which requires an innate talent. Such talent cannot be learned entirely from books. The profession is so closely allied to the arts that no license could ever guarantee a minimum competency in work. It is difficult to license the matter of taste.

(7) A need for tremendous record keeping and huge license fees would result from licensing of decorators and would merely encourage more costly bureaucracy and the employment of unnecessary board members, clerks and investigators to keep needless records.

(8) The consumer is already protected against misrepresentation and fraud by existing laws and enforcement agencies.

(9) There has been no public sentiment or demand for such licensing.

(10) Licensing would arbitrarily destroy present job classification provisions in labor contracts which have been acquired through literally decades of hard bargaining. The results would be two categories of employees, decorators with a license and employees without a license.

In an effort to cover every aspect of the licensing problem the proponents of the bill were asked by the subcommittee whether or not the same recognition of the interior decorators and designers professions could be achieved by an active public relations program by their respective professional organizations. The committee was advised that many persons who could qualify under a licensing law might not be members of a profesisonal organization and consequently would not benefit from any public relations program that was carried on. There was some doubt expressed as to whether even members of professional organizations would benefit from such a program.

Your subcommittee also propounded the question to each witness as to whether voluntarily licensing of persons who could qualify would alleviate some of the alleged problems and at the same time be acceptable to the profession. The effect would be to create two groups of interior decorators, those who are licensed and, secondly, those who are not licensed. While the proponents of licensing were willing to accept such a compromise proposal, the opponents of the licensing bill in general opposed even that compromise. Their responses in general reflected the attitude that such an arrangement would create two classes of interior decorators with the result that the unlicensed decorators would occupy a second-class position in the eyes of the public. The prime objection was that it would create an inference of incompetence on the part of the unlicensed decorators.

CONCLUSIONS AND RECOMMENDATIONS

In light of the arguments presented it is the conclusion of your subcommittee that neither the necessity nor desirability of licensing interior decorators has been convincingly demonstrated.

Accordingly, it is the recommendation of your subcommittee that neither Assembly Bill No. 2293 nor the substance thereof should be reintroduced at the next sesison of this Legislature.

Your subcommittee took particular note of the problem whereby unauthorized persons are able to buy from wholesalers by virtue of possession of a seller's permit issued by the Board of Equalization.

In order to prevent further abuses your subcommittee recommends the introduction of legislation which would require that the permit clearly indicate that it is merely a sales and use tax seller's permit and not a state permit or license to engage in any particular business or occupation. In this connection your subcommittee respectfully submits the following proposed legislation:

An act to add Section 6068.5 to the Revenue and Taxation Code, to read as follows:

The permit shall clearly state that the permit is merely a "sales and use tax seller's permit" and not a state permit or license to engage in any particular business or occupation.

REPORT OF THE

ASSEMBLY INTERIM COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

on

PROFESSIONAL AND VOCATIONAL STANDARDS

MEMBERS OF SUBCOMMITTEE

REX M. CUNNINGHAM, Chairman

JAMES L. HOLMES

HAROLD K. LEVERING

FRANK LUCKEL

DON MULFORD

LETTER OF TRANSMITTAL

February 18, 1959

Hon. Ralph M. Brown, *Chairman*
Assembly Interim Committee on Governmental Efficiency and Economy
State Capitol, Sacramento, California

Dear Chairman Brown: In accordance with your instructions, your subcommittee has undertaken the study of the subject matter of Assembly Bill No. 3664 (Cunningham), relating to the separation of the healing arts professions from the Department of Professional and Vocational Standards.

Your subcommittee held two hearings on this subject, the first hearing was conducted on July 28, 1958 in Monterey, California, and the second hearing was conducted on January 21, 1959 in the State Capitol, Sacramento, California.

The attached report contains the findings, conclusions and recommendations of your subcommittee.

Respectfully submitted,

Rex M. Cunningham, *Chairman*
James L. Holmes
Harold K. Levering
Frank Luckel
Don Mulford

REPORT OF THE SUBCOMMITTEE ON THE DEPARTMENT OF PROFESSIONAL AND VOCATIONAL STANDARDS

The problems before your subcommittee for consideration were as follows:

(1) Shall the professions of dentistry, medicine, pharmacy and allied professions be separated from the Department of Professional and Vocational Standards?

(2) Shall the Governor be required to give consideration to a list of five or more persons submitted for each appointment to the Board of Medical Examiners, the Board of Dental Examiners and the respective boards of each of the allied professions?

Allison G. James, D.D.S., representing the Joint Legislative Committee of the Northern California Dental Association and the Southern California Dental Association, testifying in favor of the separation told the committee that the professions concerned were interested in a more comprehensive change than Assembly Bill No. 3664 alone would bring about.

Briefly stated, Assembly Bill No. 3664 provides for the creation of a division within the department which shall consist of the Board of Medical Examiners, the Board of Dental Examiners and the California State Board of Pharmacy. A further provision would require the Governor to give consideration to a list of five or more persons submitted by the various professional associations in connection with the appointment of members to their respective boards.

The separation contemplated by Doctor James would require the creation of a new State Department of Health. The department would consist of a Division of Healing Arts and include also the Department of Public Health. The witness advanced several reasons in support of his proposal for separation from the Department of Professional and Vocational Standards. Initially it was suggested that inasmuch as the various licensees supply the funds through their annual license fees for the operation of their respective boards that expenditure of those funds should be determined by the board itself subject, of course, to legislative audit.

Referring specifically to the Board of Dental Examiners, Doctor James indicated that one of the chief objections to the present arrangement is that the lay employees of the Board of Dental Examiners are actually employees of the Department of Professional and Vocational Standards and subject to the department's direction and restrictions rather than those of the Board of Dental Examiners. He suggests that the same personnel directly and immediately responsible to the Board of Dental Examiners would be more efficient.

Doctor James also suggested that complaints, primarily those relating to dissatisified applicants for licensure cannot be properly handled by a lay director above the Board of Dental Examiners. He does not feel

that a lay director would be competent to evaluate results or grades in the highly scientific and technical professional examination.

Commenting on that aspect of Assembly Bill No. 3664 which would require the Governor to give consideration to certain lists preliminary to making the appointments to the various boards, Doctor James acknowledged that the requirement in its present form was permissive and consequently did not compel the Governor to make his appointments from the panel submitted. The committee was advised, however, that the medical and dental professions felt that the permissive aspect was unsatisfactory and it was recommended that legislative action be taken to establish the appointment by the Governor of members of the boards of examiners from panels submitted by the respective associations.

Your subcommittee was informed that, in general, the views expressed by Doctor James on behalf of the dental associations were concurred in by the California Medical Association and the allied professions, primarily pharmacy, the dispensing opticians, the veterinarians and the registered nurses.

Mr. H. Jack Hanna, Director of the Department of Professional and Vocational Standards, appeared at the request of your subcommittee. He told the subcommittee that the department was very much in favor of the autonomy of the various boards within his department. He declared:

> The department under my direction has never at any time advocated any change in the autonomous condition or position of the various boards, of which there are some 28 at the present time. The acts themselves define and set out the autonomy that the Legislature intended that these various boards should have, and I believe there will be no testimony that the department has ever made any effort to infringe upon that autonomy in any degree. If we ever have I would certainly like to hear about it and would make every effort to correct it immediately.

Director Hanna favors the creation of a separate division for the healing arts within the departmental structure. He recommends, however, that such a division should include not only medicine, dentistry and pharmacy, but all of the healing arts.

Turning to the question of the appointive power of the Governor, Director Hanna told the committee that the department had no objection to that portion of Assembly Bill No. 3664 relating to appointments of members to the various boards. He hastened to add that the Chief Executives of the State for the past several years have made very excellent appointments to these boards.

With reference to the appointing power as it applies to employees, Director Hanna testified:

> Dr. James made a statement awhile ago that the boards should have the appointing authority because no lay person could possibly know that was the proper activity for these people. I would have to take exception to that on the grounds that those boards meet anywhere from two to five or six times a year—in the case of the medical board they meet normally four times a year—and when

they meet their entire time is devoted to studying the program and the policies they want to adhere to—their examination facilities and their examination program and to hearing the various complaints that have been prepared for them. Certainly the department, under no circumstances, would want to impede or impair that in any way whatsoever but it is my contention that no board of that nature that meets as rarely as they meet and who are certainly lay people from the governmental standpoint, can possibly direct the activities of the employees who have to work on a day-to-day basis. For that very reason this department was formed a long time ago because there had been great criticism of these very small groups, out more or less on their own, many times not carrying out the intention of either the Legislature or the Governor, and for that very reason the over-all administrative day-to-day activity was vested in the department. While it is true that the director is the appointing authority, I am sure no one can make any proper allegation that the department has ever attempted to influence any board in the selection of competent employees. We lean upon them completely for the competence of the people they want. We assist them in every way possible in getting specifications written into the Civil Service Act that will permit them to have professional people as they want them in their particular activity. I do believe, however, and I would be very strong in this contention, that whoever sits in the position of the director of whatever department these agencies happen to be housed should by all means be the appointing authority for the simple reason that it would be a completely untenable situation if he were to have to have the responsibility of four or five hundred employees with no authority for who they were or how they worked or what they did. Now understand me, I am speaking strictly of administration. It is not only the employees of the board but the employees of my office, including myself, whose conscionable duty it is to carry out the program and the policy of these various boards.

There were various other witnesses representing other segments of the healing arts group. In general their views were in accord with those expressed by Doctor James. By way of summary the healing arts groups were desirous of achieving either of the following in the order named:

(1) That a new department be set up for the healing arts.

(2) That the Department of Public Health be reorganized to include the healing arts.

(3) That a new division for the healing arts be set up within the Department of Professional and Vocational Standards.

At a subsequent meeting of your subcommittee on January 21, 1959, Anthony J. Kennedy, Legislative Advocate for the Joint Legislative Committee for the Southern California State Dental Association and the California State Dental Association, advised members that a meeting of the healing arts group had been held in San Francisco on December 29, 1958, and that it was still the desire of these groups to remove the healing arts from the Department of Professional and Vocational Standards. The dental, medical, pharmaceutical and optometric groups and the registered nurses are very much in favor of such a division.

The groups interested in the separation of the healing arts professions would not object to the inclusion of any profession which might properly be regarded within the healing arts classification. The matter has been presented to the veterinarians, but no decision has been reached by that group yet.

Vincent S. Dalsimer, recently appointed Director of the Department of Professional and Vocational Standards, appeared before your subcommittee to offer whatever assistance that he could. Director Dalsimer suggested that perhaps another level of administration within the department might render a greater and more efficient service to the agencies which make up the department. He did not object to the creation of new divisions within the department but felt that they would be beneficial only if the additional executive positions required for the proper administration thereof would actually be filled. However, he indicated that he was hesitant to recommend the creation of new executive positions even though the Department of Professional and Vocational Standards does not operate out of the General Fund at a time when the overall program of the Administration and the Legislature calls for economy.

Director Dalsimer pointed out also that further studies would have to be made to show that the expenses involved were justified in the light of the benefits to be derived. Director Dalsimer did not agree that a complete separation from the department was in order at this time. He felt that the public was being well served and that before a separation from the department could be justified, every effort to correct whatever situation might be considered the basis for the separation should be thoroughly examined and corrected wherever possible.

Commenting on the appointment of employees of the various boards, Director Dalsimer said:

> It appears to me that it would create a rather anomalous and even untenable position on the part of the director, whomever he may be, to have the obligation of exercising control over the department, co-ordinating the administration of the various agencies within the department, and co-ordinating the fiscal affairs of the several agencies were he not the appointing power in regard to three, four or any of the various agencies. I think it is a universally recognized precept of administration that where a person is made responsible in any regard, he must be given commensurate authority. I feel, therefore, that the adoption of such a provision would result in a serious blow to the efficiency of the overall administration of the department.

CONCLUSIONS

The medical, dental, pharmaceutical, optometric and registered nurses professions are very desirous of achieving a clear-cut separation from the Department of Professional and Vocational Standards. Their ultimate goal is the creation of a State Department of Health consisting of a division for the healing arts and also a Department of Public Health. The reasons presented to your subcommittee in support of such a separation were somewhat obscure. Whether or not the separation will promote efficient and economical operation of the respective boards is clouded with considerable doubt.

The professions enumerated above are also desirous that legislation be enacted which would compel the Governor to make appointments to the various professional boards from a list submitted by the respective professional associations. It should be observed that no criticism of any previous board appointment was presented to the subcommittee in support of this recommended change.

The Department of Professional and Vocational Standards is not opposed to the creation of a Division of Healing Arts within the existing framework of the department.

While the department has no objection to the proposal whereby the Governor would be required to give certain lists consideration prior to appointing any member to a vacancy on any board, there is considerable opposition to the proposal to empower the respective boards to appoint its employees. The objection has considerable merit from a purely administrative point of view.

By way of summary, it is the position of the Department of Professional and Vocational Standards that the public is presently being adequately served and that consequently it would be imprudent to make any changes unless there is some prospect that the public's interest might be endangered.

Assembly Bill No. 3664 does not in its present form achieve the separation from the Department of Professional and Vocational Standards which is desired by the healing arts professions. The portion of the bill relating to the appointments to the various boards by the Governor is permissive and has no practical value.

RECOMMENDATIONS

Accordingly, it is the recommendation of your subcommittee that any further consideration of the substance of Assembly Bill No. 3664 in its present form be abandoned inasmuch as it does not achieve the objects of the learned professions involved, nor does it have the endorsement of the Department of Professional and Vocational Standards.

The testimony of the representatives of the healing arts professions and of the Department of Professional and Vocational Standards suggests that there is room for improvement and considerable thought should be given to the possibilility of drafting legislation which will improve the present operations of the various healing arts boards and inure to the benefit of the public generally.

REPORT OF THE

ASSEMBLY INTERIM COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

on

REAL ESTATE

LETTER OF TRANSMITTAL

March 13, 1959

HON. RALPH M. BROWN, *Chairman*
Assembly Interim Committee on Governmental Efficiency and Economy
Sacramento, California

DEAR CHAIRMAN BROWN: In accordance with your instructions, your Subcommittee on Real Estate has studied the so-called "advance fee racket" and Assembly Bill No. 743, authored by Assemblyman Glenn Coolidge, which was introduced in connection therewith.

The first hearing of your subcommittee was held in Los Angeles on January 27 and 28, 1958, and the final hearing was held in Santa Barbara on June 19, 1958. In addition the staff has accumulated considerable documentary evidence which is now a part of the records of your subcommittee.

The report of the subcommittee is submitted herewith.

Respectfully submitted,

JAMES L. HOLMES, *Chairman*
HAROLD K. LEVERING
ALBERT I. STEWART

REPORT OF THE SUBCOMMITTEE ON REAL ESTATE

A searching inquiry was conducted by your subcommittee into the so-called "advance fee racket." At the request of Chairman Holmes, the substance of the problem was presented by Assemblyman Glenn Coolidge. He told the committee:

> "* * * a number of individuals and corporate entities, sometimes referred to as promoters, operating with their principal or main offices in California, have themselves and through their high pressure salesmen and agents, engaged in the business of making false and fraudulent misrepresentations to the owners, lessees, or renters of property, for the purpose of inducing the owners to execute agreements to entrust money to the promoters to be utilized by the promoters for promised services, such as advertising, distribution of brochures, and to establish contact with brokers and prospective buyers, in order to promote the sale, lease, rental or exchange of the property of the owners.
>
> "* * * promises are made by the promoters with no intent of making a bona fide effort to render such service, and with the intent to render merely token services; and the effectiveness and efficiency of their service is grossly misrepresented by the promoters.
>
> "Newspapers and magazines of general circulation have not been found to engage in the aforesaid reprehensible practices.
>
> "* * * promoters have sought to shield their activities under the guise of operating as mere finders or locators of buyers, or as being engaged exclusively in the advertising or publishing business, and to claim that they are not operating as real estate or business opportunity brokers or salesmen.
>
> "* * * it is necessary to subject the advance fee business to regulation and to limit the persons or entities who engage in the advance fee business to those of proven honesty and integrity, and to establish a fiduciary relationship between the promoters and the owners by requiring that they be licensed as business opportunity brokers and salesmen."

Representatives of the Real Estate Commissioner's Office reported that they had received numerous complaints which confirmed the existence of certain questionable activities by advance fee operators. Deputy Real Estate Commissioner Robert Claffey told the committee:

> "As a result of the many hundreds of complaints received by the California Division of Real Estate, the division sent out questionnaires in excess of 1,500. These replies came back to the division giving the bits of information that you have just heard.
>
> "We have analyzed those complaints, and a recent examination of over 600 complaints filed in the California Division of Real Estate at Los Angeles alone discloses the following statistical data.

"These complaints were received from owners of real estate, businesses, and farms in forty different counties of the State of California, and from residents of 14 other states, and the territory of Hawaii and Canada.

"Over 63 firms and individuals were named in these complaints. Some of these firms and individuals are currently being investigated by the California Division of Real Estate, the Federal Trade Commission, and the Post Office Department.

"The Division of Real Estate has recently received 257 complaints against one of these operators, 78 of which, of these complaints, came from the County of Los Angeles alone.

"* * * The total amount of the contracts obtained by these operators is very substantial. From the information obtained in our investigation of these complaints, it is believed that a gross volume in excess of $1,000,000 a year was received by each of the three leading advance fee operators.

"Because these advance fee operators refuse to permit the division to audit their accounts, the total amount of all the income received by these operators is not known. "It is apparent from the investigation already conducted that there is an urgent need for remedial legislation to correct this evil that is causing such distress and great financial loss to the owners of real estate and businesses in the State of California, and elsewhere. * * *"

Many of the alleged "victims" of these practices testified in detail about their experiences with advance fee operators. Their testimony revealed that, for the most part, contracts were frequently negotiated in haste and without full understanding largely because of the extravagant promises and representations of the advance fee agents.

There was some evidence of carelessness on the part of many of the alleged "victims." The following excerpts from testimony and affidavits presented to your subcommittee are somewhat indicative:

(1) "Mr. Peterson drew a contract, read portions of it to me, and I signed it without reading it. My glasses were not readily available and I cannot read without them. After I signed the contract, Mr. Peterson gave me a copy and left. I then read the contract after obtaining my glasses and realized that I had been cheated and mislead."

(2) "Mr. Peterson drew a contract and I signed it: He did not read the contract to me and I did not read it."

(3) "* * * 'Okay, you sign your name here.' Then he shoved another one out just like this here with his hand over the top of it, and he said, 'This part over here is for the record, too.' I said, 'No wait.' I am subject sometimes that I cannot read too close so being on the good side of him, the way he was talking, well I thought this part you want me to sign here, now, is that just like one of those real estate deals that after three months I can get anybody else to try and sell the place for me? He said it was so I signed it."

A factor common in the testimony of the witnesses was their failure to seek advice or counsel from an attorney, an authorized real estate agent, a banking official, or any other person.

Representatives of several of the so-called "advance fee operators" testified before your subcommittee that they were engaged in a legitimate advertising enterprise. They pointed out to the committee that their contracts are quite specific in every detail, particularly with respect to the services they promised to render. It was conceded that there might be some misrepresentation on the part of some of the salesmen, but in no case is such misrepresentation authorized, encouraged, or condoned by the advance fee operators whom they represent. It was further contended that any fraud on the part of any advance fee operator or his representatives could be reached through existing laws.

Maxwell E. Greenberg, attorney representing a corporation known as Business Mart of America, Inc. (formerly known as Charles Ford and Associates, Inc.), in referring to Assembly Bill 742, told the subcommittee:

> "The intent of the bill is to provide control over the activities of disreputable promoters, some of whom exist in every industry, and some of whom are in the field of business opportunity advertising, but we say that there are firms in this field that do not engage in these unethical practices; that a valuable service is being performed, real advertising as promised is given, and that this bill would unduly harrass those firms that are in the business of offering these advertising services for sale."

Mr. Greenberg suggested to the committee that it was his opinion that existing laws are ample to cover any fraudulent activity in the business opportunity advertising field. He said:

> "* * * I cite certain sections of the Business and Professions Code. Particularly Section 17500 and those sections following, in the Business and Professions Code, which make false statements, made to induce the public to enter into any obligation to buy services, professional or otherwise, a misdemeanor, just as business opportunity brokers without a license is a misdemeanor.
>
> "And those sections certainly are available in addition to the basic law of theft, which makes obtaining money under false pretenses criminal."

Commenting on the report of the Real Estate Commissioner's Office that they had received many complaints, Mr. Greenberg told your subcommittee that the number of complaints received about his company are very, very low. This conclusion was based on his contact, the Better Business Bureau, particularly the National Better Business Bureau. He added:

> "* * * it seems odd to me that the Real Estate Commissioner would be besieged with hundreds and hundreds of complaints when the National Better Business Bureau nationally had less than ten over a two-year period, or less than ten over a considerable period of time.
>
> "And it seems to me it is one thing to get complaints when you solicit complaints and another thing, there are probably in addition unsolicited complaints. The question for the consideration of the committee is, are these complaints so widespread, so pernicious, that they justify legislating in an area, particularly making real

estate brokers and business opportunity brokers out of an industry which we believe is far greatly distinct from that particular area of activity."

Assistant Attorney General Lee Stanton told the committee that some amendments to the present law are needed because of the difficulty the Attorney General's Office is meeting in enforcing the law as it is presently written. Mr. Stanton said that the present laws would not take care of the problem effectively. He declared:

"* * * We do have laws against false advertising, and we do have laws against theft, and misrepresentation. But we don't have the law that specifically covers this type of transaction.

"I might call your attention to this point. Like all licensing laws, they find out that an evil exists and they say, 'Well, now, the best way to prevent this evil is preventative measures, rather than waiting until the crime is committed. We are going to make it illegal to do this operation except by people who are honest and have certain qualifications.'

"So now this law which we have is preventative. It says we are not going to let anybody enter in this field until they first prove they are honest and of good moral character and that way we won't have all these things happening. We won't have all this fraud and misrepresentation.

"So that is the basis of the law, to be preventative by requiring licensing of these individuals beforehand rather than pursue them afterwards for fraud, or misrepresentation, or what have you."

CONCLUSIONS AND RECOMMENDATIONS

An analysis of the testimony received by your subcommittee reveals that there are a number of so-called "advance fee operators" who are engaged in the conduct of legitimate advertising businesses. There is also ample evidence of numerous instances where advance fee operators have employed fraudulent or borderline practices in their dealings with their clients.

It was also evident to the subcommittee that many of the clients who are "abused" are somewhat careless in their contract negotiations with "advance fee operators".

There is no doubt that the public is entitled to protection from reprehensible activity of this sort. However, your subcommittee is not convinced that Assembly Bill No. 742 will provide that protection without infringing upon the right of certain legitimate operators to do business. The committee is also inclined to share the view that existing laws now protect the public from fraudulent activity.

It is therefore the recommendation of your subcommittee that Assembly Bill No. 742 not be reintroduced in its present form. Your subcommittee further recommends that the matter of fraudulent activity in the field of advance fee operations be carefully evaluated with the aim of determining why the existing laws do not provide adequate protection to the advance fee operator's client who has paid for a worthless service, with the ultimate object of remedying that situation.

REPORT OF THE

ASSEMBLY INTERIM COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

on

SECRECY IN STATE GOVERNMENT

MEMBERS OF SUBCOMMITTEE
CARLOS BEE, *Chairman*
ALBERT I. STEWART
RALPH M. BROWN
Ex Officio

LETTER OF TRANSMITTAL

December 30, 1958

HON. RALPH M. BROWN, *Chairman*
Assembly Interim Committee on Governmental Efficiency and Economy
State Capitol, Sacramento, California

DEAR CHAIRMAN BROWN: Your Subcommittee on Secrecy in State Government has conducted a survey of various agencies in the State of California in connection with the conduct of their meetings and the availability of their records for public inspection. Your Subcommittee herewith submits its report based upon excerpts from replies of these agencies.

Respectfully submitted,

CARLOS BEE, Chairman
ALBERT I. STEWART
RALPH M. BROWN, ex officio

REPORT OF THE SUBCOMMITTEE ON SECRECY IN STATE GOVERNMENT

The following letter was forwarded to the heads of 38 departments, boards, and commissions of the State of California which are not at present subject to antisecrecy in government regulations:

SACRAMENTO, CALIFORNIA, June 17, 1958

To: All heads of departments, boards and commissions,
State of California

GENTLEMEN: Please be advised that the following amendments to the California Code sections governing your department, board, or commission are now under consideration by the Subcommittee on State Secrecy of the Assembly Interim Committee on Governmental Efficiency and Economy.

XXX. All meetings of the board shall be open and public and all persons shall be permitted to attend any meetings of the board.

XXX. All records of the board shall be open to inspection by the public during regular office hours.

You are invited to submit your suggestions, comments, and criticisms. If you received a similar request in the past, dated November 15, 1956, and responded thereto, would you please advise this subcommittee whether there has been any change in your position on this matter since that time.

Please forward all replies to Bette Coffey, secretary to the committee, Assembly Post Office Box 30, Sacramento 14, California, on or before September 1, 1958.

CARLOS BEE, *Chairman*
Subcommittee on State Secrecy

Many replies were received in response to the inquiry of your subcommittee. The policy, actual practice and general attitude of the various respondees are summarized as follows:

POOLED MONEY INVESTMENT BOARD

A. RONALD BUTTON, *Chairman*

Meetings

"The board believes that all of its activities are open to the public scrutiny and they operate accordingly.

"The Pooled Money Investment Board has the policy that all meetings are public. The minutes of meetings are distributed to all persons requesting them. In addition, the board issues a monthly report which covers its activities in administering the investment of state funds under its control. More than 300 copies of this report are distributed each month."

3—L-3127

Records

"The records of the board are available for inspection by the public during regular office hours in the office of any member of the board."

CALIFORNIA OLYMPIC COMMISSION

JACK L. RUBIN, *Counsel*

Meetings

"* * * this commission wishes to go on record to the effect that the proposed legislation concerning public board meetings and public inspection of board records is in accord with the policy of this agency. We have in the past conducted our meetings as public meetings and have given advance notice of such meetings to all interested persons, including members of the press."

Records

All records of the commission are always kept available for inspection by the public.

CALIFORNIA AERONAUTIC COMMISSION

CLYDE P. BARNETT, *Director of Aeronautics*

Meetings

"The Aeronautics Commission has always adhered to the policy of open public meetings."

Records

The commission is also "* * * fully in agreement with open public records as a matter of policy."

WILDLIFE CONSERVATION BOARD

E. E. HORN, *Coordinator*

Meetings

"All meetings of the Wildlife Conservation Board have been and are at the present open to the public. Anyone desiring to present any matter is recognized. No action is taken by this board except during such public meetings."

Records

"All records of the board are available to anyone during regular office hours. Minutes of the meetings of the board are distributed quite widely and to anyone who requests they be placed on the mailing list to receive such minutes."

SAN FRANCISCO WORLD TRADE CENTER AUTHORITY

HARRY J. BOYLE, *Chairman*

Meetings

The chairman of the authority has no objections to open and public meetings.

Records

Likewise, there is no objection to making all records of the authority available for public inspection.

CALIFORNIA ADVISORY BOARD OF THE BUREAU OF FURNITURE AND BEDDING INSPECTION

FRED A. TAYLOR, *Assistant Director*

Meetings

"* * * insofar as the Advisory Board of the Bureau of Furniture and Bedding Inspection is concerned, they are our meetings of the board; in fact, they are even permitted to express their opinions if they so desire."

Records

"We do favor making all records of the agency open to inspection during regular office hours; with the exception that any investigations concerning a licensee conducted by the bureau or any other action leading up to a possible disciplinary proceeding, should not be of public record. There, of course, can be no objection once a final decision has been reached."

SAN FRANCISCO PORT AUTHORITY

CYRIL MAGNIN, *President*

President Magnin informed the committee that "The San Francisco Harbor Bond Finance Board is composed of the Governor, Director of Finance, State Controller, State Treasurer, and the President of the San Francisco Port Authority. This board acts upon requests of the Port Authority for the issuance of blocks of bonds—general obligation and revenue bonds."

Meetings

He added, "I see no reason why these meetings should not be open to the public.* * * "

Records

And he commented further that he could not see why the records should not be open to public inspection.

CALIFORNIA UNEMPLOYMENT INSURANCE APPEALS BOARD

GLENN V. WALLS, *Chairman*

Chairman Walls, referring to a previous inquiry by this committee dated November 15, 1956, advised that the views of the board on this matter have not changed since that date.

Meetings

Except as provided in Section 2713 of the Unemployment Insurance Code, the proposed amendments relating to public meetings apparently would not effect any change in the procedures of the Appeals Board for all of its meetings and all Referees' hearings are open to the public.

Section 2713 provided that a claimant upon a showing of good cause, may request a closed hearing except that certain employers participate in any such hearing.

Records

Except as provided in Section 2714 of the Unemployment Insurance Code, all records of meetings of the Appeals Board, as well as the record of all referees' hearings, are open for public inspection.

Section 2714 provides in effect "that all medical records of the department, except as necessary to proper administration, shall be confidential and shall not be published or open to the public.

DEPARTMENT OF MOTOR VEHICLES

PAUL MASON, *Director*

Director Paul Mason, to whom an inquiry was directed on November 15, 1956, responded to the present inquiry of this committee and provided the following information:

Meetings

The Department of Motor Vehicles has no boards or commissions and therefore the proposed amendment is not applicable.

Records

Director Mason said "* * * the department's policy regarding availability of information from its records is guided by the legal requirements of both the general body of law and the provisions of Section 130, California Vehicle Code. We regard all departmental records as public records and make them available for public inspection during office hours except those records relating to the physical or mental condition of any person. These latter, of course, are made confidential under the provisions of Section 130 (a) CVC.

"You will recall that during the 1957 Session of the Legislature attempts were made to modify Section 130 California Vehicle Code to obtain the release of information concerning the physical and mental condition of drivers to the general public and to private companies to be used in any way they saw fit. The Legislature, however, preserved the confidentiality of such records.

"There is no restriction on information from records of motor vehicle registrations and all driver records dealing with identification, history of convictions of traffic violations and of accidents and records of the department's action in regard to suspensions or revocation of the driving privilege.

"It is our intent and policy in this department to supply efficiently and promptly to the general public and to private business all nonconfidential record information which is requested, but at the same time we are dedicated to the principle that the drivers of California are entitled to preservation of their privacy as related to information which was furnished to this department in confidence, and so identified by law.

"I sincerely hope that you and your fellow committee members will agree that we owe the drivers of California this consideration and protection."

DEPARTMENT OF PUBLIC WORKS

A. H. HENDERSON, *Deputy Director*

Deputy Director Henderson speaking for the Highway Commission, advised the committee that replies were made to a previous inquiry dated November 15, 1956, by this committee in letters under the dates December 14, 1956, and December 20, 1956, and that there has not been any change in the position of the Department of Public Works since that time.

The following is a summary of the content of those replies which include a copy of a letter dated July 27, 1954, which was sent by the department to the Special Senate Committee on Governmental Administration. The letter is said to express fully the views of the department regarding the confidential nature of the records of the department.

Meetings

All meetings of the Highway Commission are now open and public. With regard to meetings of the Department of Public Works there is no comment.

Records

All official records on file with the Highway Commission are open to inspection by the public during regular office hours.

The report of this department with regard to its own records is reflected in the letter previously cited. In reply to a query as to what records are kept confidential by law the following were noted:

A. Questionnaires and financial statements submitted by prospective bidders in order to qualify for bidding under the State Contract Act. (Government Code, Section 14312.)
B. Copies of accident reports made to the California Highway Patrol by peace officers, members of the patrol, or employees of the Departments of Motor Vehicles or California Highway Patrol. (Vehicle Code, Section 488.5.)
C. Persons drilling water wells required to file reports on forms established by the Division of Water Resources. (Water Code, Section 7076.1.)

In reply to the query of what other records the department considered as not being open to public inspection, the following were enumerated:

A. Estimates of costs of projects proposed to be done under contract to be awarded to the lowest responsible bidder.
B. Estimating work sheets made in the course of preparation of estimates.
C. Names of contractors who have taken out proposal forms for state highway projects advertised for bids, prior to the time set for opening bids.
D. Real property appraisal reports.
E. Planning programs.
F. (1) Information from the Federal Government transmitted to the department with the understanding that it is to be kept confidential.

(2) Title information submitted to the Division of Water Resources by persons attempting to establish claims to water rights or other property, with the request that it be kept confidential.

G. Employee personnel reports.

H. Preliminary memoranda or reports relating to water matters.

I. Communications between officers and employees and attorneys in the department.

J. Matters involved in prospective or pending litigation.

The department believes that all of the above mentioned (A to J) should be made confidential by statute.

LOCAL PLANNING ADVISORY COMMITTEE

T. H. MUGFORD, *Director of Finance*

Meetings

"The Local Planning Advisory Committee has at all times since its inception conducted meetings open to the public."

Records

"The committee records may be inspected at any time during regular office hours."

Mr. Mugford advises that the committee intends to continue the policy set forth above whatever the action taken on the proposed amendments. He stated, "Not only do we support the proposed amendments but we commend your committee for initiating these changes which we believe will properly reflect in State law a sound and proper philosophy of governmental operation."

PACIFIC MARINE FISHERIES COMMISSION

RICHARD S. CROKER, *Chairman*

Meetings

"The commission policy is to conduct all meetings in public.

"The commission, at its annual meeting, does have an executive meeting. However, matters taken up at this meeting involve only such things as personnel, along with discussions of what takes place at the public meeting. In attendance and participating in all Executive Committee meetings are the public members of the Advisory Committee so that we feel that our commission has no secrets."

Records

Chairman Croker reports that, "All records are open to inspection during regular office hours."

The public commission was advised that the commission office was in Portland, Oregon. Chairman Croker wrote that, "Although the Pacific Marine Fisheries Commission is an interstate Commission, we feel that we must be guided in our operation by all pertinent state laws."

WESTERN INTERSTATE COMMISSION FOR HIGHER EDUCATION

HAROLD L. ENARSON, *Executive Director*

The subcommittee's letter of inquiry directed to Mr. Charles V. Dick, Executive Secretary of California Commission on Interstate Co-operation, was forwarded to Harold L. Enarson, Director of the Western Interstate Commission for Higher Education at Boulder, Colorado, for his comments. Since California participates in the commission and provides three California members to the commission, the comments of Director Enarson are most pertinent.

Meetings

The commission's meetings have, as a matter of regular policy, been open to the public.

Records

The records of the commission are available for inspection at the commission's office in Boulder, Colorado. In addition, the Interstate Compact under which we operate specifies that the financial accounts of the commission "shall be open at any reasonable time for inspection by the Governor of any compacting state or territory, or his designated representative."

Director Enarson advises that, "the operations of the Commission would not be adversely affected by the proposed amendments."

STATE WATER POLLUTION CONTROL BOARD

PAUL R. BONDERSON, *Executive Officer*

Meetings

"Although the board has not officially considered the proposed amendments to the California Code Sections governing our agency, past actions of the board indicate that the board would wholeheartedly support this legislation.

"One of the rules adopted at the first regular meeting of the State Board, held on February 2, 1950, reads as follows:

> " '6. Meetings Open to Public. The meetings of the State Board shall be open to the public, and information as to the time and place of meeting and the items on the agenda scheduled for discussion shall be made available to any person on request.'

"During its eight years of operation the board has held 54 regular meetings and 10 special meetings, all of which have been open to and attended by the public."

Records

"* * * it has always been board policy to make all of its records open to inspection by the public during regular office hours."

MARINE RESEARCH COMMITTEE

RICHARD S. CROKER, *Secretary*

Meetings

Mr. Croker advises, "The only time the MRC meets in executive session is to discuss the hiring of an individual. This, I believe, is in accordance with the general practices of such boards. At all other times the meetings are not only open to the public but we urge the attendance of those who might be interested in our deliberations."

Records

All records of the Marine Research Committee are now open to public inspection during regular office hours.

CITIZENS ADVISORY COMMITTEE—CIVILIAN PROTECTION

STANLEY PIERSON, *Director*

Referring to a previous inquiry by the Subcommittee dated November 21, 1956, Stanley Pierson, Director of the California Disaster Office, advises that the attitude of the agency has not changed since their reply thereto as follows.

Meetings

No comment.

Records

"This office, from time to time, receives from the Federal Civil Defense Administration material that is considered 'Confiidential,' 'Restricted,' and 'Top Secret.'

Such information is sent to us only on the understanding that we agree to abide by the classifications and, of course, once it is received it could be considered part of our records.

Might it not be well to add to the above amendment some phrase, such as 'except such records as may be received from a Federal department bearing security classifications'?"

RECREATION COMMISSION

LEE HELSEL, *Director of Recreation*

Meetings

Director Helsel reports, "The commission has directed that I advise your subcommittee that all meetings of the Recreation Commission are announced to the press, all interested federal, state and local agencies and individuals and are open to the public."

Records

"All records of the Recreation Commission are open for inspection by the public during regular office hours."

CALIFORNIA DISTRICTS SECURITIES COMMISSION

T. P. STIVERS, *Executive Secretary*

"These proposed amendments are consistent with the practice and policy of this Commission and no objection is offered," writes Mr. Stivers.

Meetings

Meetings are open to the public as a matter of practice and policy.

Records

Records are available for public inspection as a matter of policy.

STATE SOIL CONSERVATION COMMISSION

ARTHUR L. DARSEY, *Secretary*

Mr. Darsey advised your subcommittee that there has been no change in the attitude of the commission since their reply on November 20, 1956, to our previous inquiry dated November 15, 1956.

The 1956 response was directed to the Subcommittee by DeWitt Nelson, Director of the Department of Natural Resources speaking on behalf of all the boards and commissions serving the various divisions in his department. The following are a summary of his views as expressed in that communication.

Meetings

The boards and commissions serving the various divisions in this department operate under the policy that their meetings are open to the public and all persons, and further that all problems are thoroughly discussed in public session. Meetings and agenda are publicized in advance with special notices being sent to persons known to be particularly interested in the subject matter on the agenda.

Records

The records of meetings are likewise considered to be public and open for inspection during regular office hours.

Director Nelson adds, "* * * I see no reason why they or this department should oppose the legislation under consideration * * *"

Mr. Darsey also provided the subcommittee with the following ready reference applying to the meetings and records of the State Soil Conservation Commission. The commission has filed this policy in the California Administrative Code in Title 14, Division 2, Chapter 6:

> "2100 (e). *Meetings and Records Open to Public.* All meetings of the commission shall be open to the public. The files and records of the commission shall be available for inspection at its headquarters during regular business hours."

DEPARTMENT OF PROFESSIONAL AND VOCATIONAL STANDARDS

WILLIAM E. BARBEAU, *Executive Secretary and Registrar*

Board of Landscape Architects.
Board of Examiners in Veterinary Medicine.
Yacht and Ship Brokers Commission.

Commenting on behalf of the boards and commission listed above, Mr. Barbeau said:

Meetings

"We would like to go on record and state that all meetings of the boards and commission listed above are open and public and all persons are permitted to attend such meetings.

"The only exception to the above statement is when the boards and commission are discussing examinations or investigations."

Records

"In regards to records; with the exception of examination problems and investigations, all other records are open to the public inspection during regular office hours."

DIVISION OF SMALL CRAFT HARBORS

DALLAS M. HERING, *Administrative Assistant*

Mr. Hering advised " * * * that the Small Craft Harbors Commission is in full accord with the amendments as proposed and has no suggestions or criticisms to make."

Meetings

"Since the activation of the Small Craft Harbors Commission, all meetings of said commission have been open to the public."

Records

"The minutes of said meetings have been available to the public as requested."

CHIROPODY EXAMINING COMMITTEE

WALLACE W. THOMPSON, *Executive Secretary, Board of Medical Examiners*

Meetings

"We would suggest that the same type of wording be used in relation to the meetings and records of the Chiropody Examining Committee as is used in the provisions of Section 2121 and 2122 of the Business and Professions Code relating to the activities of the Board of Medical Examiners. This would provide that the Chiropody Examining Committee could hold executive sessions to prepare, approve, grade or administer examinations and to deliberate on decisions to be reached in connection with proceedings conducted under Chapter 5, Part 1, Division 3, Title 2 of the Government Code, although at the present time the committee does not have the authority to hear disciplinary actions against licentiates who hold Chiropody Certificates."

Records

"We also suggest that the amendment in relation to the records of the committee be worded as follows: 'Except as otherwise provided by Law, all records of the Committee shall be open to inspection by the public during regular office hours.' "

PSYCHOLOGY EXAMINING COMMITTEE

WALLACE W. THOMPSON, *Executive Secretary, Board of Medical Examiners*

Secretary Thompson reports that, "Under the provisions of Chapter 6.6 of the Business and Professions Code, the Psychology Examining Committee is charged with the enforcement of said chapter and in this connection they are required to give examinations and to conduct disciplinary matters against persons who have been issued certifications by the committee."

Meetings

"We believe that it would be desirable to provide in any amendment to the provisions of Chapter 6.6 relating to meetings and records that the committee be authorized to hold executive sessions to deliberate on decisions to be reached upon evidence introduced in a proceeding conducted in accordance with Chapter 5, Part 1, Division 3, Title 2 of the Government Code and to hold executive sessions to prepare, approve, grade or administer examinations."

Records

"In connection with the records of the committee, we suggest that the wording be similar to that adopted at the last session of the Legislature relative to the Board of Medical Examiners and several other agencies within the department as follows: 'Except as otherwise provided by Law, all records of the Committee shall be open to inspection by the public during regular office hours'."

PHYSICAL THERAPY EXAMINING COMMITTEE

WALLACE W. THOMPSON, *Executive Secretary, Board of Medical Examiners*

Meetings

Mr. Thompson suggests that, "the same type of wording be used in relation to the meetings and records of the Physical Therapy Examining Committee as is used in the provisions of Section 2121 and 2122 of the Business and Professions Code relating to the activities of the Board of Medical Examiners. This would provide that the Physical Therapy Examining Committee could hold executive sessions to prepare, approve, grade or administer examinations and to deliberate on decisions to be reached in connection with proceedings conducted under Chapter 5, Part 1, Division 3, Title 2 of the Government Code, although at the present time the committee does not have the authority to hear disciplinary actions against licentiates who are licensed or registered."

Records

He also suggests that, "The amendment in relation to the records of the Committee be worded as follows: 'Except as otherwise provided by Law, all records of the Committee shall be open to inspection by the public during regular office hours'."

BOARD OF HARBOR COMMISSIONS FOR HUMBOLDT BAY

LESLIE M. WESTFALL, *Commissioner, Secretary-Surveyor*

Meetings

The commission does not object to open meetings.

Records

The commission does not object to open and public records.

Commissioner Westfall writes, "We have received a letter from Chairman Carlos Bee of the Subcommittee on State Secrecy outlining two amendments to the California code sections governing this commission. Please be advised that we have duly considered both of these amendments and find nothing objectionable about either one as pertains to this organization."

ADVISORY COMMITTEE ON REFORESTATION METHODS

EMANUEL FRITZ, *Chairman*

Meetings

Chairman Fritz replies, "This is an excellent law and I have noted that the Board of Forestry always holds its meetings open to the public.

"At meetings of our Advisory Committee on Reforestation the same attitude holds. As chairman I would welcome the attendance of others who contribute something. I appreciate that it drags out meetings, introduces extraneous material and encourages over-articulated people, but on the other hand some good ideas may be uncovered."

He also adds, "As a citizen I should like to add, however, that there are times when certain legislative committees meet and discuss problems of public security when I think they should be given some discretion as to closed meetings and executive sessions because of the damage that might be done from the premature leakage of information."

Records

No comment.

CALIFORNIA MARITIME ACADEMY

HUGH GALLAGHER, *Chairman, Board of Governors*

Meetings

Chairman Gallagher comments as follows:

"To the first amendment add the following sentence relative to holding executive sessions:

> " 'Notwithstanding this provision, the Board of Governors may hold executive sessions to consider the employment of personnel, the expulsions suspension, or disciplinary action in connection with any student at the Academy, if a public hearing on such a matter would lead to the giving out of information concerning students in violation of the rules prescribed in Section 24560 of the Education Code as applied therein to a minor pupil.'

"The inclusion of authority to hold executive sessions is proposed solely for the purpose of protecting the personal rights of individuals who may come before the board under the conditions noted. It has been the experience of the board that in such matters, there have been instances wherein information developed was of such a nature as to possibly be of future disadvantage to the individual concerned and which would not be of general interest. The board feels that in dealing with young men of the age group of the academy students, great care must be exercised to avoid impairing their future contributions as good citizens because of some youthful indiscretion. It is not the intention of the board in making this recommendation, to in any way deny information which should properly be in the public domain."

Records

No comment.

CALIFORNIA RECIPROCITY COMMISSION

PAUL MASON, *Chairman*

Meetings

Paul Mason, chairman of the commission replied, "The California Reciprocity Commission does not appear to be affected by these provisions since all commission meetings are open to the public if they care to attend.

Records

No comment.

CONCLUSIONS

In general the responses to the inquiry of your subcommittee indicate a willingness and desire on the part of the respondents to conduct the business of the State "in public." Certain exceptions, where matters of personnel, examinations, questionnaires and financial statements of prospective bidders, etc., are concerned, have been suggested and warrant careful consideration.

RECOMMENDATIONS

It is the recommendation of your subcommittee that appropriate legislation be introduced at the 1959 Regular Session of the Legislature to expand the existing antisecrecy in government laws to include all of the boards, commissions, and committees which are not presently required to conduct open and public meetings and to make their records available for public inspection.

REPORT OF THE

ASSEMBLY INTERIM COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

on

TRADING STAMPS

MEMBERS OF SUBCOMMITTEE

GORDON H. WINTON, Chairman

WILLIAM BIDDICK, JR.
JOHN A. BUSTERUD
ERNEST R. GEDDES
HAROLD SEDGWICK

LETTER OF TRANSMITTAL

Hon. Ralph M. Brown, *Chairman*
Assembly Interim Committee on Governmental
Efficiency and Economy
State Capitol, Sacramento, California

Dear Chairman Brown: In accordance with your instructions and pursuant to House Resolution No. 220 of the 1957 Regular Session, your subcommittee has conducted an exhaustive investigation of the trading stamp industry and its operation in the State of California.

Assembly Bill No. 2162 and Assembly Bill No. 3149, both of which deal with the regulation of trading stamps, sales premiums, and gifts, were assigned to your subcommittee for study. However, in view of the tremendous scope of these subjects, and the admitted concern of the proponents with the matter of trading stamps alone, this study has been confined to the trading stamp industry, its operations and effects in our State.

Public hearings were conducted in San Francisco on November 5 and 6, 1957, in Merced on November 13, 1957, and in Los Angeles on November 15, 1957, at which time numerous witnesses representing both the proponents and the opponents of the proposed legislation appeared and testified.

The subcommittee wishes to express its appreciation to Francis R. Ruggieri, Committee Consultant, for his careful research and analysis in connection with the following report.

The attached report contains the findings, conclusions and recommendations of your subcommittee.

Respectfully submitted,

Gordon H. Winton, Jr.
Subcommittee Chairman
William Biddick, Jr.
John A. Busterud
Ernest R. Geddes
Harold Sedgwick

TRADING STAMPS

During the past 60 years an ever increasing number of family shopping lists in the United States have been punctuated with a very simple mandate * * * "don't forget the trading stamps."

The subject of that mandate, the trading stamp, is a piece of gummed paper generally somewhat smaller than an ordinary postage stamp. The trade name or symbol of the stamp company which sells it to the retailer is usually printed on its face. It is available to the "stamp-saver" in an assortment of colors.

The trading stamp made its first modern appearance in 1891, when Schusters Department Store in Milwaukee, Wisconsin, began issuing blue stamps which were redeemable in cash or its own merchandise. One thousand (1,000) stamps, representing purchases which totaled $50, could be redeemed for 70 cents cash or $1 in merchandise. Schusters sold the blue stamps to other Milwaukee merchants who in turn issued them to their customers. However, the stamps were redeemable only at Schusters.

In 1896, at Bridgeport, Connecticut, Thomas A. Sperry conceived the idea of the trading stamp company as an independent business, and with Shelley B. Hutchinson organized the Sperry & Hutchinson Company. Its purpose was twofold, i.e., first, to provide a group of noncompeting merchants with the same trading stamp, thereby enabling the members of the group to promote the business of each merchant in the group; and secondly, to provide a method of giving their customer a discount for each cash sale or prompt payment. The success or failure of the business was largely dependent upon the achievement of these purposes. The S & H Stamp Plan was enthusiastically presented to the retail trade by its creators, and the green stamp was soon being issued by merchants throughout New England, the Middle West and the South, to their stamp-saving customers. Redemption centers, stocked with a variety of items, were opened so that "stamp-savers" who had accumulated one or more full books of stamps could redeem them.

With the possible exception of the period during and after World War II, when the shortage of merchandise created a seller's market, the trading stamp industry has enjoyed moderate success and steady growth from its inception. Many new trading stamp companies have been formed and are now operating. Powered by the introduction of trading stamps into the retail food trade, the growth of the trading stamp industry during the past 10 years has been phenomenal. An increasing number of retail outlets and associations of retail outlets have developed their own stamp programs. Trading stamps can now be obtained by "stamp-savers" with their purchases anywhere in the United States and in parts of Canada.

TRADING STAMP ACTIVITY INCREASES

A precise measurement of the widespread use of trading stamps is obviously impractical. The most recent statistics are based on estimates of trading stamp activity during the year 1956. The constantly increas-

ing popularity of trading stamps would seem to indicate, however, that it is highly improbable that there has been any decline in their widespread use since that time.

It has been estimated that during 1956, at least 40 million families in the United States were saving trading stamps. The housewife is concededly the most ardent "stamp-saver." However, most trading stamp companies have added items of particular interest to the male member of the family to their long list of premiums in order to interest them in stamp saving.

Trading stamps are obtained by the stamp-saving customer from a wide variety of outlets. Prior to 1950 they were issued primarily by gasoline stations, dry goods stores, drugstores, hardware stores and other independent retailers. During the year 1950 many of the food supermarkets began issuing trading stamps to their customers. This marked the beginning of the trading stamp industry's most significant growth during its entire history.

By 1956 there were 150,000 to 200,000 retailers throughout the United States distributing trading stamps to their customers, usually at the rate of one stamp for each 10 cents spent by the stamp saving customer.

Approximately 400 trading stamp companies are selling trading stamps throughout the United States. Their gross sales during 1956 have been estimated to have reached the $600,000,000 mark. This figure is some measure of the enormity of the industry. This dollar volume does not include the gross business of retail-owned and operated stamp programs. It is presumed that the volume of the latter would be somewhat unimpressive by contrast to the volume of the independent stamp companies.

TRADING STAMPS IN CALIFORNIA

The trading stamp has been used in California since 1897 without interruption. The growth of this business in California has closely paralleled that in other states.

It is estimated that during 1956, 53 business organizations were operating in California as trading stamp companies. The taxable sales during 1955, 1956 and 1957 of 13 such companies were as follows:

Year	*Taxable Sales*
1955	$13,630,000
1956	17,978,000
1957	24,748,000

The Division of Research and Statistics which provided the figures above advises that one of the companies whose volume is included in the taxable sales discontinued its operations at the close of 1956. Still another apparently suffered a business failure in the final quarter of 1957, at which time it ceased to operate. The best information available indicates that there are many trading stamp organizations now operating in California. The most complete list of these organizations includes:

A & H Blue Stamps
5906½ North Figueroa Street
Los Angeles

Action Stamps
630 North San Mateo Drive
San Mateo

American Cup Stamp Company
2464 San Bruno Avenue
San Francisco

American Premium Stamp Co., Inc.
13454 Ventura
Sherman Oaks

Big M Stamp Company, Inc.
922 A Street
Hayward

Blue Chip Stamp Company
2020 Broadway
Oakland

Blue Circle Company
6087 Sunset Boulevard
Los Angeles

Blue & Gold Stamp Company
2472 E. Colorado
Pasadena

Breuner's Cash Check Stamp Co.
604 K Street
Sacramento

Cash Dividend Check System
2304 Huntington Drive
San Mateo

Champion Cash Dividend Stamps
Ontario

Community Stamp Company
3699 Mission Street
San Francisco

Community Trading Stamp Company
2845 W. Pico Boulevard
Los Angeles

E & H Trading Stamp Company
1523 No. Western Avenue
Los Angeles

Eureka C & S Stamps
The Nuggett Market
157 Main Street
Woodland

Family Discount Stamp Company
2845 W. Pico Boulevard
Los Angeles

Fidelity Stamp Company
7934 W. Third Street
Los Angeles

First Choice
137 Olive Street
Fresno

G & W Brown Stamp Company
2418 16th Street
Sacramento

Gold Arrow Premium Co., Inc.
9900 Washington Boulevard
Culver City

Gold Arrow Trading Stamp Co.
5556 Washington Boulevard
Los Angeles

Gold Bond Stamp Company
1628 Hennepin Avenue
Minneapolis, Minnesota
(18 outlets in California)

Hallmark
Cal-Fair Market
2660 E. Colorado
Pasadena

Jet Stamps Enterprises
Post Office Box 3033
Bakersfield

King Cole Market Stamps
647 W. Holt Boulevard
Ontario

KLOX
KLOX Radio Station
San Jose

H. S. Koff Company
7934 W. 3rd Street
Los Angeles

KSBW Dividend Stamps
KSBW Radio Station
Salinas

Liberty Gift Stamp Company
5897 So. Main Street
Los Angeles

Local Bonus Stamps
521 Main Street
Woodland

McGown Drug Store Stamps
133 Shoppers Lane
Covina

Maximes Dry Goods Store
408 E. Colorado
Pasadena

Mission Street Merchants
Coupon Company
2717 Mission Street
San Francisco

Mutual Bonded Traded Stamps, Inc.
1948 Colfax
Concord

Orange Premium Stamp Company
P. O. Box 906
Riverside

Prosperity Gift Stamps
200 W. Harvard
Glendale

Prudential Stamp Company
5556 Washington Blvd.
Los Angeles

Raisin Bonus Stamp Company
Raisin Market
421 N. Atlantic Blvd.
Monterey Park

Red Bonus Stamps
1346 Lengfellow Avenue
Chico

Shamrock Stamp Company
3317 E. Harvey
Fresno

The Sperry & Hutchinson Company
1446 Market Street
San Francisco

Standard Stamps, Inc.
137 E. Olive
Fresno

Thank U Token
1541 Washington Avenue
San Leandro

Thrift-Script Corporation
345 Taraval
San Francisco

Thrift Stamp Company
202 E. Main
Stockton

Thrifty Green Stamps, Inc.
4279 N. First Street
Fresno

Thrifty Shoppers Script Co.
593 Market Street
San Francisco

Top Value Enterprises, Inc.
126 S. Ludlow
Dayton, Ohio
(one outlet in San Diego)

Torley's Market Stamps
416 E. Holt Boulevard
Ontario

United Stamp Company
3232 Mission Street
San Francisco

United Trading Stamp Company
1209 Arch Street
Philadelphia, Pennsylvania
(3 outlets in California)

Wise Owl Trading Stamp Co.
944 N. E Street
San Bernardino

Yuletide Bonus Stamp Company
1823 University Avenue
Berkeley

Several of these companies are no longer operating. Others which do not appear on the list may be in operation. There does not appear to be a single official source of accurate information with respect to the number and identity of organizations in the trading stamp business in California. The Division of Research and Statistics suggests that some of the companies are primarily engaged in other lines of endeavor and distribute trading stamps in order to promote their regular lines of business, or as a minor branch of their business. Where such is the case, it is impossible to isolate figures which represent the volume of trading stamp sales. The tax return which must be filed does not itemize the type of sales giving rise to the reported taxes.

It is readily apparent that it will be extremely difficult, if not impossible, to estimate the volume of sales of the trading stamp industry in California. However, the healthy national volume these companies are enjoying, considered together with the number of trading stamp companies in California, gives some indication that the trading stamp industry may be one of California's most significant business operations.

TRADING STAMP PLANS AND METHODS OF OPERATION

Acquiring a Stamp Program

Most retailers obtain the trading stamps they distribute to their customers from independent trading stamp companies. There are some minor variations in the conduct of a stamp program by the various trading stamp companies. The basic procedures which relate to distribution of trading stamps to retailers, fixing the cost of stamps, issuance of stamps by the retailer to his customers, and redemption, are, however, quite similar.

One of the most popular stamp plans begins with the execution of a contract in writing by and between the retail merchant and the trading stamp company. The latter agrees to provide the retailer with trading stamps, catalogs, stamp books, advertising, and such advertising materials as are needed, and the retailer agrees to pay for the service, and to offer to issue such stamps to his customers with their purchases.

Some of the independent trading stamp companies, and other organizations conducting trading stamp programs, merely sell the stamps to retail merchants who wish to distribute them to their customers.

There are a limited number of trading stamp companies which make their stamps available to any retail merchant who has the desire and is able to purchase them. However, most companies do not license competing retailers within a designated area to use their service, unless

there is a mutual agreement between parties concerned. The same is true of most companies which merely sell stamps to the retailer without regard to a license arrangement. At the same time there is a continuous effort on the part of the stamp companies to interest merchants in every area of the retail trade in a trading stamp program. Local law prohibits the issuance of trading stamps with the purchase of a limited number of products, such as milk and alcoholic beverages. There is some evidence that certain manufacturers are opposed to the issuance of trading stamps with the purchase of their products. Nevertheless, stamp companies have been successful in their efforts to make stamps available from a wide variety of retail outlets. The "stamp-saver" may now obtain the coveted bit of gummed paper in the color of her choice, with a small purchase at the variety store, or with the purchase of her automobile, or real estate in some instances. The obvious result of the widespread availability of trading stamps is increased sales volume for the trading stamp organizations. In addition, the "stamp-saver" is provided with the opportunity to accumulate stamps more rapidly.

Cost of Stamp Programs

A number of factors control the cost of a trading stamp plan to the retail merchant. The most significant include the base price of the stamps or stamp service; the quantity of stamps used by the retailer, and the retailer's policy with respect to the issuance of trading stamps.

The initial cost of the stamps or stamp service varies from two dollars ($2) to three dollars ($3) for each one thousand (1,000) stamps that the retailer uses. They are generally available in pads of five thousand (5,000) stamps. The retailer who uses a large quantity of stamps may generally purchase them at a slightly reduced cost.

The retailer ordinarily issues one stamp for each ten cents ($0.10) worth of merchandise purchased by the customer. If the retailer issues stamps on all his sales, their cost will amount to from two percent (2%) to three percent (3%) of his gross sales. The cost of a trading stamp program can be reduced or minimized when it is carefully conducted. The retailer who attempts to reduce his costs by failing to offer stamps to the purchaser, or by imposing unwarranted and cumbersome restrictions with respect to the issuance of the stamps, generally neutralizes the promotional value of the stamps by the ill will he creates. A retailer can legitimately reduce his costs when he:

(a) Determines whether he will issue stamps on cash purchases only, or upon both cash and credit purchases, and then adheres to that policy;
(b) Establishes a working rule defining where "breakage" occurs, that is, whether the customer making a purchase which amounts to $1.75 is entitled to 17 or 18 stamps;
(c) Issues to the purchaser only the number of stamps to which the latter is entitled;
(d) Does not issue stamps to purchasers who indicate they do not save stamps;
(e) Does not issue stamps for any portion of the total amount of the sale which represents sales or other taxes;

(f) Compares his stamp inventory at regular intervals with his total gross sales to determine whether stamps are being issued in accordance with his established policy.

On the other hand, the cost of a stamp plan which is carelessly administered is likely to be high and perhaps of questionable value to the retailer.

The average "stamp-saver," generally unconcerned with the cost problems of the retailer, is nevertheless consistent in her demand for trading stamps with her every purchase.

Redemption of Trading Stamps

The stamp saving customer accumulates the stamps she obtains with her purchases in books provided by the retailer. Each book has spaces for 1,200 to 1,500 stamps. The number of stamps required to fill a book depends on the requirements of the particular stamp plan that the retailer has adopted. The "stamp-saver" must make purchases totaling $120 to $150 in order to accumulate enough stamps to fill one book. The redemption value of a full book varies from $1.50 to $3.78 for each $100 purchased, or 1,000 stamps accumulated.

Some stamps may be redeemed for cash. Other stamp plans provide for redemption in merchandise only. One redemption plan permits the "stamp-saver" to redeem her book at a retail store which issues the stamp for a cash value which may be applied to any new purchase made at said store.

Most trading stamp companies, which provide for redemption in merchandise, publish catalogues which colorfully illustrate many of the items which are stocked at the redemption centers, or in their warehouses. These catalogues may be obtained at the redemption centers, or from one of the retailers who has adopted a stamp plan. The "stamp-saver" can tell at a glance the price of the merchandise illustrated in terms of filled stamp books or fractions thereof.

A wide variety of items can be obtained in exchange for one full book of stamps. These include glassware, pots and pans, camping accessories, cigarette lighters, comb and brush sets, umbrellas, towels, bed sheets, tools, Bibles, dictionaries, and assorted toys. Presentation of 20 to 25 full books for redemption entitles the "stamp-saver" to make her selection from an even more desirable premium group, which includes: moving picture projectors, silverware, electric roasters and rotisseries, vacuum cleaners, power mowers, typewriters, and watches. Most of the items available are of the finest quality and carry well known brand identification.

Redemption centers are for the most part located in metropolitan areas. They are generally well stocked with a wide variety of first quality merchandise, carrying the ordinary manufacturer's guarantee. The "stamp-saver" can redeem her stamps at the redemption center with the same confidence with which she makes a purchase at her favorite department store.

If a redemption center is not conveniently located, the "stamp-saver" may make her selection from the catalog and forward her order, together with the required number of books, to the stamp company for redemption. Most warehouses are well supplied and the premium selected is forwarded with reasonable promptness.

Stamps which have been redeemed are usually canceled, audited and then destroyed. Meanwhile, the "stamp-saver" is enjoying the premium which she has received, but her thoughts have already turned to the next treasure she desires, and the relentless task of accumulating more full books of stamps begins anew.

THE LEGAL STATUS OF TRADING STAMPS

The Legislative Approach

While the "stamp-saver" has been busily "licking and pasting," many state legislatures have been confronted with numerous bills which attempt to outlaw, restrict or control the growing trading stamp industry. Most of the legislation being considered may be categorized as one of the following types:

(1) Escheat—which provides for escheat to the State of all stamp values not redeemed within a specified period of time.
(2) Redemption in cash or merchandise—would compel redemption in cash or merchandise at the option of the stamp-saver.
(3) License fee—requiring payment of a license fee by the stamp company and/or merchant issuing stamps.
(4) Tax—would increase privilege taxes paid by the stamp companies and or merchants issuing stamps—impose a tax on the gross receipts of trading stamp companies.
(5) Outlaw quantity discount to merchants—stamp companies would be prohibited from giving a discount benefit to merchant who purchases large quantities of stamps.
(6) Absolute prohibition—would forbid the sale, issuance or use of trading stamps in any manner whatsoever within the State.

As each legislator attempts to determine which of the above types, if any, best lends itself to the development of desirable trading stamp legislation, he rapidly becomes aware of the significant history of litigation in which trading stamps have been involved. Naturally trading stamp companies have been notably tireless in their efforts to resist legislation which would outlaw, restrict or control the issuance of trading stamps.

Attempts at Prohibition or Regulation

In California the State Supreme Court has been called upon on two separate occasions to rule upon legislative attempts to absolutely prohibit the issuance and redemption of trading stamps, or to render impractical the conduct of the trading stamp business by imposing unreasonable conditions.

> *In Ex Parte McKenna* (1899) 126 Cal. 429, 58 Pac. 916, the court had before it an ordinance of the City of Fresno which imposed a license tax upon merchants doing business to a certain amount. However, merchants who used trading stamps were required to pay a tax eight (8) times greater than merchants who did not use trading stamps, regardless of the amount of business they did. The ordinance was held unconstitutional on the grounds that it was an obvious attempt, under the guise of a revenue measure, to put an end to the issuance and redemption of trading

stamps by levying a discriminatory and prohibitive tax upon merchants who resort to the use of trading stamps to attract and hold customers.

In Ex Parte Drexel (1905) 147 Cal. 763, 82 Pac. 429, the court considered a claim that an act known as "The Anti-Trading Stamp Act," adopted in 1905 (Statutes 1905, page 67), which made the issuance of trading stamps a misdemeanor, was unconstitutional. The court declared the statute to be invalid, saying:

> "The law, therefore, being settled that the legislature cannot prohibit or seriously interfere with the right of the citizen to make harmless contracts touching the acquisition, protection, management, and enjoyment of property,—contracts which do not wrongfully affect the lawful rights of others or public safety, health, or morals,—the remaining question in these cases at bar is whether trading stamps or coupons constitute contracts which are outside the protection of the constitutional principles above declared."
>
> "* * * We see nothing in such a stamp or coupon which is outside of the constitutional rights of citizens to make contracts concerning property; nothing which wrongfully interferes with the lawful rights of other persons; and nothing which the police power can reach as touching the public safety, the public health, or the public morals. * * * It is, therefore, a contract which, under the principles above stated, the legislature has no constitutional power to prohibit, or to seriously interfere with under the guise of regulation; and as the act in question undertakes to do this it is unconstitutional and void."

See also *Ex Parte West* (1905) 147 Cal. 774, 82 Pac. 434.

The holdings of our Supreme Court are in agreement with the holdings of almost every court which considered anti-trading-stamp legislation from the time of the first attempt to outlaw or restrict the use of trading stamps until 1916. (See Appendix "A" for a partial list of these cases, which undoubtedly represented the great weight of authority in this Country.)

In 1916 the United States Supreme Court, in three cases, held that the due process and equal protection clauses of the Fourteenth Amendment of the United States Constitution do not prevent a state from regulating or prohibiting the use of trading stamps or manufacturers' coupons.

Rast v. *Van Deman & Lewis Co.*, 240 U. S. 342, 36 S. Ct. 370 (1916).
Tanner v. *Little*, 240 U. S. 369, 36 S. Ct. 379 (1916).
Pitney v. *Washington*, 240 U. S. 387, 36 S. Ct. 385 (1916).

In the above cases the court held that the issuance and use of manufacturers' coupons and trading stamps could be prohibited or regulated in the exercise of a state's police power because "they tempt by a promise of a value greater than that article [sold] and apparently not represented in its price, and it hence may be thought that thus by an appeal to cupidity lure to improvidence.

> This may not be called in an exact sense a 'lottery'; may not be called 'gaming,' it may, however, be considered as having the seduction and evil of such, and whether it has may be a matter of inquiry—a matter of inquiry and judgment that it is finally within the power of the legislature to make."

Subsequent to the expression of the United States Supreme Court in the three cases cited above, there were five decisions in three states which adopted the same position as the high court. All five decisions were rendered within three years of the United States Supreme Court decision. They represent a striking departure from the great weight of authority, but it appears that no other state court has followed that line of decisions since 1919. (See Appendix "B" for these cases.)

There have been numerous decisions since 1916, however, in which state courts have declined to follow the reasoning of the United States Supreme Court. Instead they have held that any attempt to prohibit or unduly restrict and control the issuance of trading stamps was unconstitutional under their respective state constitutions. These decisions have been rendered notwithstanding the position taken by the United States Supreme Court in the three cases cited above. (For a partial list of these cases see Appendix "C".)

One of the most recent cases, *Sperry & Hutchinson Co.* v. *Hough*, 246 I. 19, 65 N. W. 2d 410 (1954), involved a statute which made a distinction between merchants who furnish and redeem their own stamps, and those who obtain stamps from another who agrees to redeem them. The statute was held invalid on the grounds that the classification made by the statute was arbitrary and unreasonable and violated the state constitution. The court commenting on the validity of anti-trading-stamp legislation concluded that the weight of authority is that:

> "Anti-trading-stamp laws constitute unnecessary restrictions on the right of contract; unwarranted interference with a natural right to attract customers; prohibit contractual relations which do not affect the public health or morals or welfare; and are not the proper exercise of police powers."

A similar statute was declared unconstitutional on June 29, 1957, by the Supreme Court of Tennessee in *Logan Super Market, Inc.*, v. *Atkins*, 304 SW 2d, 628 (1957). The Supreme Court held that an amendment increasing the amount of trading stamp tax levied by a valid existing statute was constitutional, but that the provision for levying a gross receipts tax of 2 percent upon merchants using the services of trading stamp companies in having stamps redeemed by agencies other than the merchants issuing said stamps, and exempting from such gross receipts tax those merchants giving and redeeming their own stamps, even if operating separate redemption centers, was arbitrary, capricious and unreasonable in violation of constitutional prohibition against discriminatory class legislation.

The Supreme Court of our State has not been confronted with the question of whether or not prohibition or regulation of the issuance and use of trading stamps would be valid under our Constitution since the matter was before them in the two cases cited above in 1905.

Whether or not our present-day courts would reach a conclusion consistent with those of the courts in the 1905 cases cited is purely a matter of speculation.

Legislative Counsel's Opinion

The Legislative Counsel of our State in a report dated December 13, 1957, suggested that prohibitory or regulatory legislation affecting trading stamps could be constitutional and that the courts might well sustain such action. Legislative Counsel stated:

> "We believe that, in light of the federal decisions on the problem, if the State Supreme Court were again presented the question of whether the State may, under its police power, totally prohibit the use of trading stamps, the court may well sustain the validity of such action. However, the provisions of the bill in question (A.B. 3149, as amended) do not profess to absolutely prohibit the use of trading stamps, but only to impose regulations on their use. If such regulations are not arbitrary or unreasonable in nature, we believe that they would be constitutional, irrespective of the existence of any power to absolutely prohibit the use of trading stamps."

Turning to the escheat feature of the bill, Legislative Counsel continued:

> "The provision of the bill which presents the most difficulty is the one requiring a trading stamp company to pay to the State each year an amount equivalent to the total value of all stamps which were not redeemed within the prescribed time during the preceding year.
>
> "While it may be argued that such a requirement amounts to the confiscation of the company's property, the requirement does not appear on its face to be wholly arbitrary or unreasonable. A stamp company voluntarily undertakes the obligation to redeem all of the stamps which it distributes. If the State may properly succeed to the rights of stamp holders who have abandoned or failed to exercise their redemption rights within a reasonable period of time, it would not appear that any unreasonable burden would be placed upon a stamp company to redeem the stamps upon presentation by the State. The forfeiture to the State of bank deposits which have not been claimed within a reasonable period of time by the depositor has been sustained as a valid exercise of the police power (*Security Saving Bank* v. *California*, 68 L Ed. 301), and by analogy, it would appear that the same principle, coupled with the objectives of the proposed bill, would apply to the requirements of the bill."

Escheat Problems

It would be well to note with some particularity at this point some of the important aspects of the escheat principle. The escheat proceeding is in essence a proceeding in rem which applies to abandoned property. In order for a state to have escheat jurisdiction, it must have power over the property which it seeks to escheat. This principle is enunciated in *Security Bank* v. *California*, 263 U.S. 282, 44 S. Ct. 108, (1923), as follows:

"* * * In substance it is like proceeding in escheat. * * * These are generally considered proceedings strictly *in rem*. But whether the proceeding should be described as being *in rem* or as being *quasi in rem* is not of legal significance in this connection. In either case the essentials of jurisdiction over the deposits are that there be seizure of the res at the commencement of the suit; and reasonable notice and opportunity to be heard."

Whether or not the state can meet the jurisdictional requirements (res and situs) when it seeks to escheat unredeemed trading stamps is a matter which requires careful consideration. The very nature of the trading stamp business suggests some of the factors which might present jurisdictional problems.

Many trading stamps are issued and redeemed on a multi-state or nationwide basis. Consequently, there is no way of knowing whether the stamps to be escheated are still located within the state at the time of any attempted escheat. It is also quite possible that the state would unwittingly seek to escheat trading stamps issued in California which have already been redeemed in another state. Record keeping which might alleviate these types of problems is virtually impossible. Unless some accurate means of locating stamps which have not been redeemed within one year after the date of issuance can be devised, there are serious doubts that the jurisdictional requirements for escheat can be met.

A New Jersey court recently had before it a problem involving the attempted escheat of trading stamps which had not been presented for redemption within the period of time after which the escheat statute would apply (*The State of New Jersey* v. *The Sperry and Hutchinson Company*, not yet reported, 1958).

The pronouncement of the court approved for publication on March 6, 1958, contained the following:

"In all cases heretofore determined the State was able to clearly show that certain debts or claims were due and payable to certain individuals known to be in existence at that time, but whose whereabouts or successors at the time of the action were unknown. In this case all the State can show is that in the past the company has issued a certain number of stamps to its licensees who are presumed to have passed them on to their customers, and that approximately 5 percent of those issued have not been redeemed. Who are those persons, and in what amounts have they received the stamps which are unredeemed? No one can tell."

Quoting from *State* v. *U. S. Steel Corp.*, 12 N. J. 38 (1953) the court added: "It is a well settled principle that escheat and forfeiture are not favored by the law, and any doubt as to whether property is subject to escheat is resolved against the State. 19 Am. Jur., Sec. 14, P. 387."

This case enunciates further the strict jurisdictional requirements which must be met before an escheat proceeding can be sustained.

The escheat provision of Assembly Bill No. 3149 raises a further question with regard to the reasonableness of the period of time after which escheat of unredeemed stamps is to take place. The provision

that escheat is to take place one year after the date of issuance is unusually short. Escheat statutes which have provided for such a short period of time have generally been held invalid.

Escheat laws are directed at property which has been abandoned. Many housewives accumulate trading stamps over long periods of time for choice premiums, which require more than a few full books of stamps. Can stamps which have been laboriously saved be regarded as abandoned property at the end of one year from the date of issuance merely because they have not been redeemed? The indignant "stamp-saver" would certainly rebel at the forfeiture of her rights in the stamps that she had saved, but had not presented for redemptions within one year after their date of issue. She would also vigorously deny abandonment of her coveted stamps, and it is very probable that a court faced with the problem would agree with her.

The escheat provision of Assembly Bill No. 3149 prompts still another constitutional question. The bill calls for the escheat of trading stamps which have been defined therein as "any form of stamp, cash discount stamp, coupon, ticket, certificate, card, receipt, or any similar device, or devices * * *" These items are not, however, subject to escheat if they are distributed by a manufacturer as part of the original wrapper or container in which goods are sold or are contained in, or attached to such wrapper or container. This provision by its own terms appears to be discriminatory and raises the question of whether it constitutes a deprivation of the equal protection of the laws.

In 1954 the Supreme Court of Iowa was called upon to rule on the constitutionality of a statute which imposed prohibitive burdens on trading stamp companies, but exempted from its provisions manufacturers and others who issued similar devices.

In that case, *Sperry and Hutchinson Company* v. *Hoegh,* 246 Ia. 9, 65 N. W. 2d 410 (1954), the court said:

> "The great weight of authority is against the validity of such statutes, under the equality provisions of constitutions. The general rule stated in 16 C. J. S., Constitutional Law, Section 511h, page 1027, is: 'Equal protection of the law is denied by statutes forbidding the use of trading stamps or the issuance thereof except by manufacturers or merchants redeeming them.' * * *"

Other courts have been inclined to follow the reasoning in the case cited. The California courts, if presented with a similar problem, might be disposed to do likewise. For a partial list of cases see Appendix "D."

The enactment of Assembly Bill No. 3149 would result in a test of the constitutionality of its various regulatory provisions. The court would be called upon to consider each of the problems discussed above. Legislative Counsel, confident of the outcome, states:

> "In our opinion we believe that the regulations contained in the bill would be held to be constitutional if the question were ever presented to the State Supreme Court."

A review of the constitutional problems with which the courts have been confronted, and a careful analysis of the courts' conclusions does not, in our opinion, render the outcome a certainty.

Gift Enterprise Problems

Assembly Bill No. 2162 proposes to make it a misdemeanor to engage in a gift enterprise business. Its provisions appear to be broad enough to include the issuance of trading stamps.

There is considerable authority for the position that a gift enterprise law does not apply to the issuance of trading stamps since no element of chance is involved.

In 1911 the House of Representatives of the State of Massachusetts called upon the Supreme Court for an opinion as to the constitutionality of a proposed statute which prohibited any gratuitous distributions with the sale of goods without making any distinction between trade practices which involved no element of chance whatsoever and trade practices which might involve that element. The Supreme Court in *Opinion of the Justices,* 208 Mass. 607, 94 N. E. 848 (1911) advised the legislators that such a statute would be unconstitutional. The court said:

> "There is nothing in the conduct proposed to be prohibited that necessarily appeals to the gambling instinct or involves any element of chance. Such statutes and ordinances have been held unconstitutional by the highest courts in a large number of states. * * *"

In a typical example, the Supreme Court of Alabama in *State* v. *Shugart,* 138 Ala. 86, 35 So. 28, considered the application of a gift enterprise law to the issuance of trading stamps, and declared:

> "To constitute a 'gift enterprise' * * * the element of chance must enter into the scheme. The business or transaction engaged in, or carried on, by the appellee is fully set forth in the bill of exceptions, and wholly fails to disclose any element of chance entering into its conduct. * * *"

In a more recent case the Supreme Court of Iowa in *Sperry & Hutchinson Co.* v. *Hoegh,* 246 Iowa 9, 65 NW. 2d 410, commented on the "gift enterprises" aspect of a statute which it declared unconstitutional on other grounds. The court took the position that the issuance of trading stamps could not be prohibited as a gift enterprise. The court said:

> "During the past half century many states have enacted laws similar to our gift enterprise statutes. We will not discuss all of the cases where plaintiff, or other stamp companies doing a similar business, have assailed the gift enterprise statutes as unconstitutional, but our study of the cases convinces us that the overwhelming weight of authority is that such statutes as ours are unconstitutional as not being within the sphere of police power."

For a list of other cases see Appendix "E."

The reasoning of these cases suggests that any attempt of the Legislature to prohibit the issuance of trading stamps by classifying it within the terms of Assembly Bill No. 2162 as a gift enterprise might well be declared unconstitutional.

The Legislative Counsel in a report dated December 13, 1957, regarding the constitutionality of Assembly Bill No. 2162, is of the opinion

that such a bill would probably be held constitutional. There is no doubt that the proposed act would be subject to the court's scrutiny in a test of its constitutionality should it survive the legislative process and become law. There is some doubt in our opinion that the court would sustain the constitutionality of such a statute in view of the reasoning of the authorities cited above.

Price Fixing Laws and Trading Stamps

There have been numerous attempts to use state price fixing laws to prohibit or restrict the issuance of trading stamps. The authority conferred by Unfair Practices Acts, Fair Trade Acts, Unfair Sales or Sales Below Cost Acts, Motor Fuels Acts, and other similar statutes has been relied upon in these instances. The California Supreme Court has had occasion to consider the legal problem involved.

In *Food & Grocery Bureau, Inc.* v. *Garfield,* 20 Cal. 2d 228, 125 P. 2d 3 (1942), the Supreme Court held that the practice of issuing trading stamps with minimum mark-up items did not violate the California Unfair Practices Act. The court said:

> "It is well settled by the decisions of this court, as well as those in other jurisdictions, that the practice of merchants in issuing trading stamps with the purchase of articles is merely a method of discounting bills in consideration for the immediate payment of cash. * * *"
>
> "* * * It must be concluded, therefore, that the trading stamp plan adopted by the appellant does not constitute the making of a gift of $1 in cash or $1.25 in merchandise but is a discount given the customer in consideration of his paying cash. * * *"

A short time later the District Court of Appeals in *Weco Products Co.* v. *Mid-City Cut Rate Drug Stores,* 55 Cal. App. 2d 684, 131 P. 2d 856 (1942) was called upon to determine whether the giving of trading stamps with products sold at minimum fair trade prices constituted a violation of the California Fair Trade Act. The Court held that the issuance of trading stamps did not reduce the price of the merchandise with which they were issued, and consequently did not violate the Fair Trade Act. The court declared:

> "* * * A cash discount is a reward for prompt payment. It is a trade practice long established, and is authoritatively recognized as being not a deduction from the purchase price. (Montgomery, Auditing Theory and Practice, pp. 499-500).
>
> "Consideration of such authorities as are available leads us to the conclusion that the giving of trading stamps as in the instance now before us does not effect a reduction in the price of the articles sold such as to constitute a violation of the Fair Trade Act. * * * the status of trading stamps is definitely fixed * * * as being a discount 'for the immediate payment of cash.' "

The holdings of the California courts in these cases is in agreement with the weight of authority. For a partial list of cases which hold that state price fixing laws are not violated by the issuance of trading stamps see Appendix "F."

Are Trading Stamps Securities?

Another legal aspect of the trading stamp business was subjected to the attention of the Securities and Exchange Commission when the Food Industry Alliance submitted a memorandum to the commission urging that trading stamps were "securities" within the definition of that term in Section 2(1) of the Securities Act of 1933, and therefore subject to the registration provisions of the act. In Release No. 3890, dated January 21, 1958, the Securities and Exchange Commission said:

> "The food industry's basic argument is that an 'evidence of indebtedness' is included in the statute's definition of a security, and that a trading stamp is an 'evidence of indebtedness.' However, the same argument could be made as to streetcar tokens, meal tickets, Christmas gift certificates, box tops, railroad or theater tickets and others too numerous to mention. The legislative history and other provisions of the statute indicate that the Congress did not intend to include such items within the scope of the statute.
>
> "The general counsel has advised the commission that it is his view that such stamps are not securities within the meaning of the act. The commission concurs in this conclusion.
>
> "The commission emphasizes that this release is concerned only with trading stamps redeemable in cash or merchandise. If they are redeemable in securities, then the stamps are also securities since such stamp would be a 'certificate of interest or participation in, temporary or interim certificate for * * * or warrant or right to subscribe to or purchase' a security."

In an opinion dated June 23, 1942, the Attorney General of the State of California stated that from a strictly technical point of view trading stamps fell within the definition of "securities" as defined in the California Corporate Securities Law. However, since trading stamps redeemable in goods, wares, or merchandise were regulated under Section 17700(a) of the Business and Professions Code, it was the Attorney General's opinion that the Legislature had not intended to require registration of these stamps under the Corporate Securities Law. Consequently, only trading stamps redeemable in cash, or anything other than goods, wares and merchandise, must be registered with the Corporation Commissioner, and are subject to regulation by the commission.

Unlike many of the other legal aspects of the trading stamp business discussed herein, the classification of trading stamps as a "security" has been before the courts only once. In *The Sperry & Hutchinson Co.* v. *Hudson*, 190 Ore. 458, 226 P. 2d 501 (1951), the court held that trading stamps were not a "security" under the Oregon Blue Sky Law, which contained a definition of "security" similar to the definition set forth in the California act.

With the sole exception of California, trading stamps are not required to be registered as "securities" in any state in the United States, nor under the United States Securities Act of 1933.

RECENT LEGISLATIVE EFFORTS

Notwithstanding the legal problems which have arisen from past attempts to outlaw or regulate the trading stamp industry, during 1955 50 bills were introduced in various state legislatures. Of this number 48 failed to become law. The two bills which became law encountered some difficulty.

The North Dakota Legislature enacted a license tax, authorizing any county to levy a tax of $6,000 on each stamp company conducting its business within the county's borders. However, the law was not immediately enforced, since it was subject to a referendum on November 6, 1956. The law was soundly defeated by a two-to-one majority.

The second bill which survived the legislative process made it illegal for Utah merchants to reduce prices by the use of stamps. This measure directly affects the stamp programs which are regarded as a discount for cash. The new law is presently being tested in the Utah courts by virtue of a suit filed by the Sperry & Hutchinson Company and three Utah merchants against the Utah Trade Commission.

An even greater number of bills affecting the trading stamp industry were introduced during the 1957 legislative year. The following table, provided through the research facilities of the Sperry & Hutchinson Company, graphically demonstrates the various avenues which were employed to restrict or prohibit the use of trading stamps. The table also indicates the disposition of each of the measures which were introduced in the various state legislatures.

EXISTING RESTRICTIONS ON TRADING STAMPS

Regulation of the trading stamp industry is not a new legislative endeavor. Various limitations have already been imposed on many aspects of the business.

(1) **Alabama** imposes a privilege license of statewide application against every person selling or issuing trading stamps to merchants. The county in which such business is located is also entitled to a privilege license equal in amount to one-half (½) of the state license. In addition a license is also levied against any person who issues or distributes trading stamps in counties having a population of 400,000 or more. (Affects only one county at present.)

(2) In **Arkansas** a "gift enterprise" law authorizes cities of the first and second class to license, tax and regulate gift enterprises, which is defined to include premium stamp enterprises. Such cities are authorized to levy a tax or a license fee not to exceed $1,000 per year upon each gift enterprise, and a tax or license fee not to exceed $500,000 per year upon each person, firm or corporation aiding, abetting or patronizing such gift enterprise. (Very little use is made of this authority by cities.)

(3) In **Colorado** it is unlawful to issue, give, deliver or distribute in consideration of, or on account of, or accompanying any purchase of goods, wares or merchandise, any trading stamp. After an adverse decision in the Colorado Court in 1920 (190

RECORD OF LEGISLATION PROHIBITING REGULATING OR TAXING TRADING STAMPS INTRODUCED AND ENACTED DURING THE 1957 STATE LEGISLATIVE SESSION

State	Bill No.	Flat prohibition	Escheat	Prohibitive tax on stamp companies	Prohibitive tax on merchants	"Regulatory"	Others
Alabama	S164		X			X[a, b]	
	H386		X			X[a]	
	S289		X			X[a, d]	
	S290				X		
Arkansas	H203		X			X[b, c]	
	H517			X		X[b]	
	H70		X			X[a, b]	
	H477					X[b, c]	
	S167		X			X[a, b]	
California	S1005	X					
	S1137			X	X		
	A2769			X	X		
	A3149		X			X[e]	
	A3603			X	X		
	A4052		X				
	A2162	X					
Colorado	H451		X	X			
Connecticut	H2240			X			X[i]
Florida	S91		X			X[f]	
	H282		X			X[f]	
	H854					X[a]	
	H1220					X[a]	
	H1304					X[g]	
	H1313					X[a, d]	
	H1316					X[e]	
Georgia	H382	X					
	H568		X				
Idaho	H203			X			
	S160		X			X[a]	
Illinois	S155					X[e]	
	H329					X[d, g, l]	
	H343					X[d]	X[k]
	H638					X[d, l]	X[e]
	H725		X				
Indiana	H308		X			X[a, b]	
	S257		X	X		X[a, b]	
Iowa	S55			X		X[d]	X[e, s]
	H69			X		X[e, h, l]	
	H446			X	X	X[g]	X[k]
Kansas	S73	X					
	S228				X		
	S362	passed					
	H385					X[a]	
Maine	LD1187			X		X[a]	
	LD1281			X			
Maryland	S214			X			
	H297		X				
Massachusetts	H1291		X				
Michigan	S1093					X[d, g]	X[e]
	S1387		X				

RECORD OF LEGISLATION PROHIBITING REGULATING OR TAXING TRADING STAMPS INTRODUCED AND ENACTED DURING THE 1957 STATE LEGISLATIVE SESSION—Continued

State	*Bill No.*	*Flat prohibition*	*Escheat*	*Prohibitive tax on stamp companies*	*Prohibitive tax on merchants*	*"Regulatory"*	*Others*
Minnesota	H185					X [a]	
	S1791					X [a]	
	H449					X [a, b]	
	S714	X					
	H955	X					
	H1566				X		
	H1413				X		
	H840	X					
Missouri	H382					X [a]	
	H404		X	X	X	X [a]	
	H515	X					
Nevada	S27			X	X		
	A335		X				X [n]
	A414					X [g]	
	A114					X [b]	
New Mexico	S29		X			X [a, b]	
	S51	X					
New York	S1796		X				
	A3956					X [u]	
	A2833					X [u]	
North Carolina	S319		X	X	X	X [d]	
North Dakota	S83					passed [a]	
Ohio	H199					X [a, d]	
	H573					X [w, c]	
Oklahoma	H662			X	X	X [c]	
Oregon	S29					X [a, b]	
Pennsylvania	H1142		X				
	H1246		X			X [d, g]	
	—						X [m]
Rhode Island	H1488			X			
South Carolina	S90	X					
	S166					X [b]	
	H1183	X					
	H1396			X			
	H1534					X [a]	
South Dakota	H703						X [k]
	H739					X [a]	X [k]
	H987					X [a]	
	S284					X [b, c]	
	S289			X		X [b]	
Tennessee	H202				passed [s]	X	X [k]
	H1101					X [d]	
	S182			X	X		
	S193					X [d]	
Washington	S349					X [r]	X [v]
West Virginia	H86						X [k]
	S59						X [k]

RECORD OF LEGISLATION PROHIBITING REGULATING OR TAXING TRADING STAMPS INTRODUCED AND ENACTED DURING THE 1957 STATE LEGISLATIVE SESSION—Continued

State	*Bill No.*	*Flat prohibition*	*Escheat*	*Prohibitive tax on stamp companies*	*Prohibitive tax on merchants*	*"Regulatory"*	*Others*
Wisconsin	S321					X[a]	X[p]
	A452					X[a]	X[p]
	S520		X				
Wyoming	H281					X[b]	
Totals	100	12	27	22	14	59	16

KEY— X Indicates defeated bills.
[a] Requires cash redemption value.
[b] Requires optional redemption in cash or merchandise.
[c] Prohibits exclusive contracts.
[d] Requires stamp companies to post bond.
[e] Requires name of redeeming company to be printed on stamps.
[f] Requires registration by stamp company.
[g] Requires bond of stamp issuing merchants.
[h] Requires cash redeemption.
[i] Imposes tax on merchant.
[j] Increases value of stamps.
[k] Imposes tax on stamp companies.
[l] Requires report on unredeemed stamps.
[m] Prohibits issuance of stamps with sales of milk.
[n] Calls for study of stamps.
[o] Gambling regulation reaching to stamps.
[p] Prohibits issuance of stamps with sale of gasoline.
[q] Prohibits issuance of stamps with sale of cigarettes.
[r] Requires issuance of stamps in county where sold.
[s] Declared unconstitutional by Tennessee Supreme Court 7/29/57.
[t] Requires reserve to be established.
[u] Requires deposit of stamp company
[v] Prohibits stamps on eggs, milk, poultry.
[w] Requires overprint of value on book.
[y] Requires issuance of stamps of large denomination.

NOTE: Of the total number of bills introduced in the various state legislatures only three were adopted:
Kansas completely prohibited the issuance of trading stamps.
North Dakota adopted a reasonable regulatory measure which required that trading stamps be redeemed in either cash or merchandise.
Tennessee imposed a tax on merchants issuing trading stamps. The Tennessee act was subsequently held unconstitutional (July 29, 1957) Logan's Supermarkets, Inc., etal vs. Z. D. Atkins, 404 S. W. 2d 628.

P. 1117) the Colorado Attorney General and his staff now consider that provision to be unconstitutional, and consequently have brought no prosecutions thereunder.

(4) In **Georgia** and **Rhode Island** the law provides in substance that it shall be a misdemeanor for any person, firm or corporation to issue or give away in connection with the sale of any article of goods, wares or merchandise, any stamp, commonly called a trading stamp, or other like device, which said stamp or other like device would entitle the holder thereof to receive from some other person or party than the vendor, any indefinite or undescribed thing, the nature or value of which was unknown to the purchaser at the time of the purchase of said article of goods, wares or merchandise.

"Advertising Age" in its publication of March 25, 1957, presented the following summary of pending legislation and litigation:

CURRENT STATUS OF LEGISLATION AND LITIGATION AFFECTING TRADING STAMPS

(as of March 12, 1957)

State	Bill or suit	Status
Alabama	Suit challenging Birmingham's license ordinance on trading stamps. State's tax law on trading stamps.	Hearings concluded and court's decision pending. Suit pending.
Arkansas	Bill to make trading stamps redeemable in cash as well as merchandise.	Defeated in house.
California	Bill to have funds from stamp operations in excess of expenses and redemptions revert to State treasury.	Tabled in assembly.
Georgia	Bill to outlaw trading stamps.	Shelved for this year.
Idaho	Bill to tax stamps 2 per cent, to be paid by stamp companies. Bill to escheat stamp values to the state a year after issue if not redeemed by holder.	Passed by house. Pending in senate.
Indiana	Bill to make stamps redeemable in cash as well as merchandise.	Passed by senate. Pending in house.
Iowa	Bill to levy 10 per cent tax on gross receipts of trading stamp companies.	Killed in senate.
Kansas	Bill to outlaw stamps.	In committee.
Maine	Bill to charge $500 license fee to stamp companies for each county they operate in.	Pending in house.
Maryland	Bill to increase tax from $500 to $2,500 a year on stamp companies. Escheat bill.	In senate finance and house committee.
Minnesota	Three bills: (1) would ban use of trading stamps; (2) would make stamps redeemable in cash as well as merchandise; (3) would provide that stamps be exchanged for merchandise at stores that issue them.	All three bills in house committee.
Missouri	Bill to make stamps redeemable in either cash or merchandise.	Awaiting action.
New Jersey	Escheat suit brought by State v. Sperry & Hutchinson Co. for value of unredeemed stamps between years 1896 and 1950 (AA, Dec. 10, 1956).	No trial date set.
Nevada	Bill to make stamps redeemable in cash as well as merchandise and also to escheat stamp values to the state if not redeemed one year after issue. Bill to assessess merchants who give stamps $1,000 to $5,000 a year.	Pending in house. Pending in senate.
New Mexico	Bill provides that cash value and date of issue be printed on face of stamps, and that unredeemed stamps become state property three years after date of issue.	Killed in house.
New York	Bill to make stamp issuance subject to State Banking Department.	Pending in house.

CURRENT STATUS OF LEGISLATION AND LITIGATION AFFECTING TRADING STAMPS—Continued

(as of March 12, 1957)

State	Bill or suit	Status
North Dakota	Bill provides trading stamps be redeemed in cash or merchandise. Referendum last year authorized legislation.	Passed both houses and sent to governor. He is expected to sign it.
Ohio	Bill to prohibit discrimination between businesses by operators of trading stamp plans on basis of stamp quantities purchased.	Awaiting action.
Oregon	Bill making it mandatory for stores issuing stamps to redeem them either in cash or merchandise.	In senate committee.
South Carolina	Two bills: (1) would outlaw use of stamps and premiums except for manufacturers who include them with products; (2) would require stamp companies to sell stamps to all merchants at same price regardless of quantity purchased.	(1) Killed in senate. (2) Passed by House, pending in senate.
South Dakota	Bill requiring stamp companies to report on number and value of stamps redeemed annually.	Passed by house. In senate committee.
Tennessee	Bill levying 2 per cent gross receipts tax on all transactions where trading stamps are issued, plus $600 annual privilege tax.	Passed by both houses and signed by governor. Law becomes effective August 1, 1957.
Wyoming	Bill to prohibit exclusive contracts between merchants and stamp companies.	Defeated in house.

(5) **Indiana, Maryland, Nebraska, New Jersey, Ohio** and **Utah** require:

(a) Cash redemption value must be printed on the face of the stamp.

(b) Redemption of trading stamps must be in cash or merchandise, at the option of the holder.

(c) Stamps must be redeemed upon presentation, even though presented in amounts aggregating less than a full book.

(d) Each merchant issuing trading stamps to remain liable for the redemption of the stamps issued by him if the trading stamp company, which is primarily liable for redemption, fails to redeem them.

(6) **Kansas** law effective April 16, 1958, now prohibits the issuance of the usual types of trading stamps, while trying to protect some other devices or coupons of a slightly different character.

(7) In **Kentucky** local municipalities can, and in some instance do, require licenses under their board licensing power of all businesses including the trading stamp business. Prohibitive license taxes are not permitted.

(8) **Maryland** and **Utah** require trading stamp companies to post a bond in the amount of $25,000 and $20,000, respectively, before they are permitted to do business in the State.

Maryland requires payment of an annual license fee of $500 by trading stamp companies.

(9) **Mississippi** permits cities and towns to levy a license tax of $250 on trading stamp companies.

(10) **North Carolina** requires payment of a trading stamp license tax of $200 for each county in which a trading stamp company does business.

(11) **North Dakota** law provides that all trading stamps must upon presentation by the holder be redeemed in cash at any business establishment which issues trading stamps with the sale of merchandise.

North Dakota also requires:

(a) Cash redemption value must be printed on the face of the stamp.

(b) Redemption of trading stamps must be in cash or merchandise, at the option of the holder.

(c) Stamps must be redeemed upon presentation, even though presented in amounts aggregating less than a full book.

North Dakota also requires that any person, firm, corporation or association furnishing trading stamps to retailers and agreeing to redeem trading stamps shall not discontinue the redemption of trading stamps without first notifying the Secretary of State of such intention. Upon receiving the notice, the Secretary of State directs that all funds set aside for redemption purposes be retained for a period of six months after discontinuing operation for the purposes of redeeming outstanding stamps.

(12) In **Oklahoma** a 1955 act which outlaws the giving of trading stamps as a result of state purchases is presently on the books.

(13) **Pennsylvania** authorizes councils of third class cities to impose a license tax not to exceed $100 annually on certain types of business, including trading stamp or premium companies or dealers.

(14) **Tennessee** imposes a license tax of $600 for each county in which a trading stamp company does business.

(15) **Virginia** imposes a license tax on trading stamp companies based on the value of the premium stamps sold. The tax is $50 on the first $10,000 or less, and 25 cents per $100 upon all sales in excess of $10,000.

(16) In **Washington** the issuance of trading stamps redeemable in merchandise only has been subject to a prohibitive license tax.

Washington also requires:

(a) Cash redemption value must be printed on the face of the stamp.

(b) Stamps must be redeemed upon presentation, even though presented in amounts aggregating less than a full book.

(c) Each merchant issuing trading stamps to remain liable for the redemption of the stamps issued by him if the trading stamp company, which is primarily liable for redemption, fails to redeem them.

(17) **West Virginia** demands a license fee from distributors of trading stamps of $175 for each county in which they operate.

(18) **Wisconsin** law prohibits the issuance of trading stamps by stamp companies. However, stamps redeemable in cash only may be issued by merchants.

Wisconsin also requires:

(a) Cash redemption value must be printed on the face of the stamp.

(b) Stamps must be redeemed upon presentation, even though presented in amounts aggregating less than a full book.

INTERIM HEARINGS ON ANTI-TRADING-STAMP PROPOSALS

During the 1957 General Session of the California Legislature, bills now in the hands of this subcommittee for interim study were presented, with proponents urging their passage in order to correct an assortment of alleged economic ailments.

The public hearings conducted during the interim by this subcommittee afforded its members an opportunity to learn from interested witnesses the specific grounds upon which enactment of the proposed legislation was being advocated by the proponents. At the same time the subcommittee was able to hear detailed testimony from the opponents stating their reasons for opposing the subject legislation.

The principal grounds developed by the proponents are set forth below.

Trading Stamps Produce Nothing—a Detrimental Economic Parasite

Morgan Keaton, President of the Farmers and Merchants Council, Inc., in a sweeping indictment of the trading stamp business, testified in part:

> * * * The trading stamp scheme is detrimental to the buying public, because it is a device to eliminate competition. It is an attempt to lure improvident buying; it is an economic parasite, and not a sound method of advertising. * * * Why have we made these charges? First, because trading stamps produce nothing. * * * In my humble judgment, and many others in California, the so-called stamp craze is worse than the loss-leaders, which you have outlawed. * * *

James Heassler, Chairman of the Legislative Committee for the Bay Area Council of Petroleum Retailers, and speaking in their behalf, declared:

> * * * First of all, I would like to go on record as stating that we are definitely for legislation against stamp companies. I am speaking here of stamp companies, but you can interpret it as other types of premiums and gifts also. We feel that this outside entity which attaches itself to the marketing end of the petroleum industry is a parasite. We feel that it is a nonproductive force, and thus neither adds to nor aids in the marketing of petroleum products, or increases the profit of the retailer. To explain this I would like to say that if you take the picture of the marketing end of the petroleum industry as a whole, the retailers within this

industry who give away stamps don't increase the volume sold by the industry. In other words, we'll sell no more gasoline, no more oil, because our retailers give stamps. It only means that there is a shift within the industry itself. * * *

There were some witnesses who felt otherwise:

A. E. Stebbings, Attorney for the Regal Petroleum Company of San Jose, California, in a portion of his testimony told the committee:

> * * * The basic principle of advertising is to get the other guy's customer. Of course, we have stamps to get customers from someone else. But is that wrong? They have said stamps have reached the saturation point; they are not developing new gasoline business. What form of advertising is going to develop new gasoline business, except perhaps Ethyl Corporation ads to persuade people to drive more? We just have to live, that is all. This is a keenly competitive business and stamps are the way that we stay in business. * * *

William F. Harrison, Sales Manager, Connolly's Furniture and Appliance, Inc., testified:

> * * * We feel that it builds our foot traffic, and any store survives on foot traffic in the store. * * * It helps us in many ways in closing sales, as many times they will be wavering a little bit. The advantage we have over a competitor is the fact that we can offer the green stamps. * * * We feel it has been a great deal of help. Mr. Connolly, who is the owner of the business, feels that it has added to his business tremendously over the past 10 years. * * *

I. K. Sibole, Assistant to the President of the John Breuner Company, during his appearance said:

> * * * Breuner's went into the Cash Check business 50 years ago to create more sales volume, and to increase its profits. It has stayed with the plan because the experience of all those years has demonstrated its value as an advertising medium in the Sacramento area, and later, in the Stockton area. Since it must pay all the cost of maintaining cash checks, the company has certainly benefited by increased volume, otherwise it could not afford to continue the plan. * * * Trading stamp plans are an advertising device whose great power to attract trade lies in the fact that the customer is given more goods and services for the same amount of money in return for his steady patronage. * * *

The witnesses obviously do not agree. However, the particular subject matter is not one which lends itself to agreement. The resource material reviewed in connection with this study does not support the contention that the trading stamp business is a detrimental economic parasite, which produces nothing. Studies which have been conducted by governmental agencies, academic and other inquirers indicate that in numerous instances trading stamps have been a very significant business stimulator. The success of the trading stamp companies is a testimonial to that fact. At the same time, the studies show that it would be imprudent to indulge in any generalizations. Some retailers

have used trading stamps to their economic advantage while others have derived little or no profits from them. Whether or not the trading stamp is a productive factor in our economy depends largely upon the conditions confronting a particular merchant and the community in which he conducts his business.

It might be well to note briefly the indirect contributions of the trading stamp industry to our economy. The Sperry & Hutchinson Company, recognized as the oldest and largest stamp company, provided the committee with information about their operation, as it affects other branches of American business and trade.

In the conduct of its business, The Sperry & Hutchinson Company occupies four floors in a building in New York City. Approximately 5,000 people are on the payroll of the company. Five hundred merchandise redemption centers and warehouses, 70 of which are in California, are operated from coast to coast. The company purchases more than 1,500 different nationally advertised items of merchandise. It is a leading purchaser from such companies as General Electric, International Silver, Cannon, Bulova Watch, Westinghouse, Samsonite, Spaulding and numerous other well-known American manufacturers. The company pays taxes and makes purchases in every state.

The catalogue published by the Sperry & Hutchinson Company constitutes one of the largest business publication printing orders in business history. The company reports that 7,000,000 pounds of paper were used in the production of the 1958 premium catalogue. If laid end to end, the catalogue published annually would be 4,000 miles long; stacked on top of one another the catalogues would be 150,000 feet high, 100 times higher than the Empire State Building. Approximately 72,000 pounds of stitching wire were used in the binding operations and 190 railroad cars (a train more than two miles long) will be needed to transport the catalogue to more than 70,000 destinations.

Admittedly, these statistics apply to the Nation's largest stamp company. However, there are numerous other major stamp companies whose operations are so extensive that they create significant economic activity in acquiring the facilities, personnel, premiums and services they need.

The charge that the trading stamp business is parasitical is not supported by the testimonial evidence, nor by the resource material. Its value as a factor in determining the necessity for legislation is questionable.

Trading Stamps Increase Retailers' Costs and Consumers' Prices

Everyone agrees that maintaining a trading stamp program is an expense to the retailer. He must purchase the stamps or stamp service he wishes to use in the conduct of his business. As indicated in detail earlier in this report, the cost of a stamp program is generally 2 percent to 3 percent of gross sales. The retailer must determine whether or not he wishes to incur that cost. A careful analysis of his business operation will assist him in making a decision.

Several witnesses branded trading stamps as an unnecessary added cost which burdens the retailer with increased operating expenses and the consumer with higher prices. No concrete evidence in support of this contention was offered to the committee.

There is no doubt that the cost of a trading stamp program must be offset in some way. But, the suggestion that the adoption of a trading stamp program leads *inevitably* to increased operating cost and higher consumer prices is a generalization of doubtful merit. A number of witnesses in nonfood retailing testified to the contrary:

In response to a series of questions by the Committee Consultant, **Carl B. Hathaway,** representing Safeway Cleaners, Burlingame, California, testified as follows:

> * * * I'm only here for one reason, to tell you what green stamps have done for me. I've only had them in three years. Since I put them in my business has increased close to 60 percent and I have cut my advertising budget down from 5 percent to about 1 percent. I feel that saving is passed on to the customer through the redemption of the stamps.
>
> Q. What is the cost of the stamp program in the terms of percentage?
>
> A. It costs me about 2.97 percent.
>
> Q. Your volume you say has increased to such a point that you have been able to pay for that program?
>
> A. Actually it is cheaper than before because of the advertising budget I had previously. * * *

Joseph Stefani, Stefani's Mens and Boys Wear, Merced, California, responded on cross-examination as follows:

> Q. * * * Do you find it is necessary in your business to pass on the costs of the stamp program to the consumer in terms of higher prices?
>
> A. Well, Mr. Ruggieri, first above all, I do not regard stamps as a cost at all. In other words, it is customary in my business to advertise to the extent of about 4 percent. I choose to spend 2 percent with the stamp people and 2 percent on the newspaper and radio. I know that is definitely bringing me returns.
>
> Q. Do you include it as part of your advertising budget?
>
> A. That is my advertising cost, including the stamps.
>
> Q. And then consequently it has no particular effect on your average markup?
>
> A. No, the markup remains the same. There is no difference in markup. * * *

Thomas M. McCarthy, Santa Monica pharmacist, testified in part:

> Q. I want to ask you about this cost factor that we have discussed so much in these hearings. The cost of the stamp program, of course, is an additional cost of doing business to you?
>
> A. Yes.
>
> Q. Do you find it is necessary to pass that cost on to the customer or do you absorb it in your present operating budget?
>
> A. No, I don't pass it on at all. I compete with prices all the way down the line. I undercut some of the biggest operations and I am able to do that because of my volume, and I attribute the volume to the stamps.
>
> Q. In other words, your increased volume is sufficient to take care of the cost of that particular program?
>
> A. Yes, it is. * * *

It appears that the retailers, whose testimony is set forth in part above, have been able to offset the cost of their trading stamp program without increasing consumer prices.

Witnesses representing the retail food industry were the most vigorous advocates of the "increased operating cost and higher consumer prices" argument. This industry operates on a very low mark-up, and is consequently particularly concerned with the problem of holding down operating costs. Trading stamps were labeled an added cost which could not be offset. It was suggested that food prices would necessarily be increased if the use of trading stamps was not curtailed. However, no concrete evidence of increased food prices as a direct result of trading stamp activity was presented to the committee. The testimony of one of the witnesses representing the retail food industry very aptly illustrates this point.

Donald B. Conroy, Sales and Promotional manager of Thriftimart, Incorporated, Los Angeles, appeared to tell the committee some of the problems trading stamp tape plans and other premium programs create for the retail food industry. On the subject of prices, he testified in response to questions of the committee consultant as follows:

> Q. * * * You have some sort of a tape plan which is a premium operation?
>
> A. It is. We went into that as a defensive measure until some legislation was passed, or we knew where it was going to lead. * * *
>
> Q. And you find in that premium type promotion that it is necessary to raise your prices to pay for the program?
>
> A. It would be in the long run.
>
> Q. Well, is it?
>
> A. It has got to come from somewhere. Well, we just started in a defensive measure. * * *

The witness advised the committee that his company had not been using the tape plan long enough to feel the impact of redemptions. Consequently, the question of whether or not prices must be increased had not reached the "showdown" stage. Answering questions by Chairman Winton, the witness testified:

> Chairman Winton: * * * Well, in your studies that you have made in your business, have you found that this (tape plan) has increased your total promotion costs?
>
> A. Definitely.
>
> Chairman Winton: In other words, it has been added on to the top of what you already had?
>
> A. That's right.
>
> Chairman Winton: Has your company raised the prices to compensate for it?
>
> A. Probably not at the moment. But we operate on such a close margin you have to do something. * * *

Some evidence which indicated that food prices were not *necessarily* increased by the use of trading stamps was offered to the committee by other witnesses.

Eugene R. Beem, Professor of Business Administration, University of California at Berkeley, and author of "Who Profits From Trading Stamps?" (*Harvard Business Review*, November-December, 1957, Vol. 35, No. 6), at the request of the Sperry & Hutchinson Company, presented the subcommittee with some of the highlights of his recent two year study of trading stamps.

In reply to preliminary questions by members of the subcommittee the U. C. economist testified:

> Dr. Beem: * * * For the last two years I have worked, in addition to my teaching, on a research project dealing with consumer premiums of various types. The study has been supported by our Bureau of Business and Economic Research at the University of California, and it has been the objective of contributing fuller understanding to the nature of our competitive economy. The Sperry & Hutchinson Company has requested that I share with you some of my findings and the conclusions of my study.
>
> Chairman Winton: May I ask you one question right there? Is your study in any way financed by the Sperry & Hutchinson Company?
>
> Dr. Beem: No, that was the next thing I was going to come to. Neither Sperry & Hutchinson Company, nor any other stamp company, nor for that matter any other business interest, has contributed any kind of financial support to the study. It has been financed by state funds through our Bureau of Business and Economic Research.
>
> Chairman Winton: Thank you.
>
> Assemblyman Busterud: Are you now employed by the Sperry & Hutchinson Company?
>
> Dr. Beem: No, I am teaching at the University of California. I have no relationship of any sort to the Sperry & Hutchinson Company.
>
> Assemblyman Busterud: I see, you are just giving us the results of your study here.
>
> Dr. Beem: I simply have been requested by them to tell you what findings I had and what conclusions I reached. * * *

NOTE: The subcommittee has been informed that subsequent to the hearings Professor Beem has become associated with the Sperry & Hutchinson Company.

With regard to the effect of trading stamps on consumer prices, with particular emphasis on consumer food prices, Professor Beem stated:

> Dr. Beem: * * * Some of the evidence is conflicting, but no one yet has been able to show systematic evidence that stamps cause higher prices. There is no doubt at all that the weight of the edidence available in the area of food retailing (where most of the studies have been concentrated) indicates that stamps have either had no impact at all on prices, or that stamps have held down price increases. I would like to review this evidence with you.
>
> Surveys by food trade papers reveal that some stamp users have raised prices after adopting this form of promotion and that some have lowered prices. But the net result of these surveys is consistent with the conclusion that stamps have not caused general price increases. Here is a summary of how 77 stamp-using grocery

firms, operating 1,360 supermarkets, answered a supermarket merchandising mail questionnaire on this question in mid-1956:

Higher prices	11.7%	(3.4% of total markets)
Lower prices	11.7%	(9.3% of total markets)
No change	76.6%	(83.3% of total markets)

Progressive Grocer's Survey of a large sample of independents about the same period showed a somewhat similar picture. * * * Analysis of the price data gathered by the Bureau of Labor Statistics is the clearest indication that stamps have not forced up food prices in general. In fact, these data suggest that stamps may have held down price increases, a tenable hypothesis in light of the fact that price reduction has been the dominant strategy used by nonstamp stores to counter stamps. * * *

Harry L. Bouchier, who profitably operated nine U-Tell-Em Markets in Orange City and Long Beach until April, 1957, when he sold out, told the committee, in response to questioning by Chairman Winton:

* * * Well, I would like to say that I started with S & H stamps in 1953 and had four stores. I sold out in April of this year the nine stores. I attribute a good deal of the success to the use of the stamps. * * *

Chairman Winton: Did you find that you could absorb the cost of the stamps in your business?

A. Yes, we did.

Chairman Winton: Were your prices competitive with the other supermarkets?

A. Very competitive. * * *

The effect of trading stamps on consumer food prices has been the subject of many studies. A careful survey of some of the most significant studies reveals that they uniformly do not support the contention that the use of trading stamps *inevitably* leads to higher consumer food prices.

Professors Albert Haring and **Wallace Yoder**, of the Marketing Department, School of Business, Indiana University, in their study entitled "*Trading Stamp Practice and Price Policy*," used the Bureau of Labor Statistics of the United States Department of Labor, Consumer Price Index, Food Section, and employed two methods of analysis, which produced the conclusion that in general trading stamps do not raise food prices.

The first method involved a comparison of food prices between stamp and nonstamp food stores in Indianapolis. The report states that:

"* * * If there were any tendency for prices at stamp giving food stores to be higher than average in Indianapolis, the tendency was not significantly apparent."

Under the second method of analysis, food price indexes for each of 15 large cities where trading stamps were being used in a significant number of food stores, were compared with food price indexes for five large cities where trading stamps were not an important factor. This

comparison showed that on a city by city basis there is no evidence that "* * * The introduction of trading stamps into a market had any identifiable influence" on raising food prices.

Dr. Harvey L. Vredenburg, Teaching Associate in Marketing at Indiana University, independently conducted an exhaustive study of the use of trading stamps. As a part of his research he attempted to compare prices of stamp and nonstamp stores. He concluded that a scientific comparison of prices was almost impossible due to the operation of other factors, such as, location, services, brands and frequent price changes. He states that "sometimes the truism that the consumer must pay all costs of doing business is used to convince the public that stamps have to be paid for by higher prices. This sounds logical to the consumer, but the economics of overhead costs can refute the implication. If a store can gain sufficient volume (or offset the cost of stamps in other ways discussed above) without proportionate increases in overhead expenses, this reduction in the operating expense ratio can cover the cost of stamps and the consumer will not have to pay increased prices. The statement that the consumer has to pay all costs of doing business remains true, but the implication that prices will be advanced to include the cost of stamps is not necessarily correct. * * *"

R. H. Anderson and **E. W. Lamborn**, of the Department of Agricultural Economics, of the Utah State University, who are conducting a number of marketing and consumer preference studies, declared in an article appearing in *Farm and Home Science*, Vol. 18, No. 3, September, 1957, (published by College of Agriculture, Utah State University) that "Trading stamps do increase costs. The retailer must pay for the stamps. * * * If the stamp plan results in a sufficient gain in sales, as was true in the case studied, the retailer's cost in percent of sales may not increase. This is because his overhead cost may be spread over more volume. Under these circumstances the retailer may actually boost his profits and keep his prices down. * * *"

The Agricultural Marketing Service of the United States Department of Agriculture, in its study of the effects of the use of trading stamps by grocers on marketing practices, costs and efficiency, published its report in January, 1957, entitled *Do Trading Stamps Affect Food Costs?* The study determined that "Whether prices of food products to consumers are increased by use of trading stamps is a question on which opinions differ widely." A need for further study of the effect of trading stamps on food prices was indicated. A subsequent study by the same marketing service, dated May, 1957, produced equally inconclusive results. The report stated that "Until more information is available on the effect of trading stamp plans on prices of foods purchased, no generalization can be drawn as to whether a consumer gets something for nothing, pays part, all, or even more than the cost of similar merchandise purchased for cash. It can vary from community to community, from store to store within the same community, and even within the same store at different periods of time. * * * Consumers will have to evaluate grocery store prices and the merits of merchandise obtained for stamps the same as they would in any other buying situation."

The Business Service Bulletin of the United States Department of Commerce, dated September, 1956, contained a summary of information on trading stamps. The summary suggests that where conditions are favorable, the retailer may enjoy increased volume without increasing his operating costs, and greater profits without increasing his prices. The summary does note with particularity that prices may have to be increased to maintain a profitable margin under certain circumstances.

Trading stamps do cost money. Like advertising, rent, salaries, credit, utilities, etc., they are a cost of doing business, but they are a cost which may be offset in numerous ways. However, if a retailer is unable to offset the cost of his trading stamp program, he is confronted with the choice of reducing his margin of profit or maintaining it by raising his prices.

It should be obvious that a retailer may increase his prices to offset the cost of a trading stamp program which he employs. However, it is equally clear that the use of trading stamps does not necessarily increase consumer prices.

Trading Stamps Are an Unfair and Deceptive Form of Advertising

The testimony of several of the proponents of trading stamp legislation was flavored with implications that the trading stamp business was conducted in an unfair, deceptive and fraudulent manner.

Joe Lewkowitz, Daly City service station operator, referring to the use of trading stamps openly declared:

> "It is an unfair way of doing business. We are fooling the public."

The testimony of the witness was of interest to the committee since it set forth some of the specific problems of service stations operators. However, it did not lend any support to his charge of unfairness and deceit.

Morgan Keaton was more purposeful in his charges. He declared:

> "We think that there is a fraud perpetrated because they (trading stamp companies) tried to make people think they are getting something for nothing which is not true, whether the merchant pays for it or the housewife pays for it."

The remarks of the witness are undoubtedly based on his belief that the "prices" (in terms of stamps or books of stamps) of premiums or redemption merchandise established by the trading stamp companies are high, and that, as a result, the stamp saving customer receives little value in redeeming stamps.

In this connection, it should be noted that in California, and at least 24 other states, a stamp redemption transaction is regarded as a retail sale for sales tax purposes. If the "stamp-saver" does not already know the value of the stamps which she has so laboriously accumulated, she can very readily make a cash value comparison when she pays the tax on her stamp redemption transaction.

The opponents of trading stamp legislation vigorously denied the existence of any kind of fraudulent activity, and noted that fraud,

misrepresentation and false and misleading advertising are all prohibited by existing provisions of the Penal Code. Their contention was strengthened when under direct questioning many of those urging legislative controls responded to the effect that they know of no fraudulent or deceptive activity on the part of trading stamp companies.

The implications of fraudulent and deceptive practices by trading stamp companies were further dispelled at a public meeting of the committee in Sacramento when a representative from the Attorney General's Office advised the committee that no complaints or suggestions of fraud by trading stamp companies had come to the attention of that office.

On the federal level, the Federal Trade Commission launched an investigation inquiring into the operations and business methods of certain trading stamp companies, following receipt by the commission of complaints from individuals and businessmen condemning the use of trading stamps as an unfair method of competition or as unfair or deceptive acts or practices in commerce. Upon completion of its investigation, the Federal Trade Commission announced on October 7, 1957, that it did not consider trading stamp plans in themselves to be unfair methods of competition under the laws it administered, and concluded not to issue any complaints at that time prohibiting the use of trading stamps.

It would appear that the charge that trading stamps are an unfair and deceptive form of advertising is without foundation.

Retailers Are Coerced Into Using Trading Stamps

The committee heard charges that the retail merchants are coerced into using trading stamps. The reference was obviously directed at what might be deemed "economic coercion," and not coercion of a violent or unsavory nature.

Morgan Keaton, on behalf of the proponents, responded to a query of the committee consultant as follows:

> Q. Is there any question in your mind that the participation in the stamp program is completely voluntary by the merchant?
>
> Mr. Keaton: No, it is not voluntary.
>
> Q. I wonder if you would care to elaborate.
>
> Mr. Keaton: Well, it is not voluntary because we all have to live and if the fellow down the street starts taking my business away from me through some stamps, I have to fight back. I have to fight back fire with fire. It is no longer voluntary on my part. * * *

Mr. Kosturos, Secretary of the Independent Grocers Association testified:

> " * * * The stamp companies—the representatives—are very happy to sell you the stamps. It means more profit to them. I am not saying the merchants are forced to take the stamps, it's voluntary, but if your competitor has them across the street, you necessarily have to have them because if you don't give them away people won't come in."

The statements of these witnesses very aptly set forth the problem described as "economic coercion." There is no doubt that the competition of a neighboring merchant who gives trading stamps may be a very compelling factor in causing another merchant to use trading stamps. The success of most retail businesses hinges on the operator's ability to attract and hold customers.

Consumer demand for trading stamps was suggested as another factor which "coerced" the retailer to adopt a stamp program. The statistics previously set forth in the report indicate that there are a large number of stamp savers among the consuming public. There are doubtless some areas where the popularity of trading stamps exercises a strong influence on the retailer's decision to adopt a trading stamp program. Due to the wide variety of patronage motives, it has been difficult to determine what influence the issuance of trading stamps with purchases has on the selection of a store by the consumer.

Professor Eugene R. Beem, U. C. Economist, told the committee that studies which have been conducted showed that:

> * * * Stamps are a *dominant* shopping patronage motive, with only a tiny handful—perhaps 1 percent to 3 percent of the shoppers—who give stamps as their number one patronage motive. In other words, consumers like stamps, but not at the expense of basic merchandising attractions, such as price and quality of merchandise.

Closely akin to the problem of using a trading stamp program because of so-called "economic coercion" is the matter of voluntary abandonment of such programs by retailers. While the economic factors which convince some retailers that they must use a stamp plan must be recognized, the retailer is nevertheless free to abandon the plan if he is displeased with its operation.

Committee members directed inquiries to several witnesses in an attempt to learn if retailers were willing to abandon the use of trading stamps voluntarily. The responses of the witnesses revealed that retailers in general are unwilling to abandon stamp plans because of the competitive advantage it would afford those retailers who favor trading stamps and have no desire to discontinue their use.

Certainly competition and consumer demand may be strong factors which prompt retail merchants to adopt trading stamp plans. At the same time it should be understood that the use of trading stamps by the retailer is entirely voluntary and may be abandoned at his pleasure. Under such circumstances it would be well to consider whether "coercion" with its derisive connotations is not being confused with "competition in the market place."

The Franchise System Is Unfair and Discriminatory

The committee heard the complaint that the franchise system was unfair and discriminatory. The basis for this complaint seemed to be that it prevented some retailers from using the particular trading stamp they desired.

Odell Grady, Merced service station operator, declared:

> * * * I feel that there is only one trading stamp that has a great deal of drawing power and this stamp is not available to me because of the franchise system. Other Texaco dealers have them but they are not available to me and I feel this is discriminatory.

Most trading stamp companies limit the number of retail merchants to whom their trading stamps or trading stamp service is made available. Under such a system the trading stamp company permits only a limited number of merchants in a particular line of retailing within a specific competitive area to use its trading stamps or trading stamp service. This arrangement is usually based on a contractual agreement between the merchant and the trading stamp company. However, some companies employ this system merely as a matter of policy.

Representatives of several trading stamp companies explained to the committee that retail merchants adopt trading stamp plans to promote their businesses. They pointed out that when any promotional device is available to all merchants its value as a promotional tool is seriously impaired.

Burleigh Pattee, member of the law firm of Chickering and Gregory, representing the Sperry & Hutchinson Company, in developing the matter a little further told the committee:

> * * * The basis of selection of the merchants who are offered the system is that used by any business—the reputable store with good present and prospective business potential. The only merchants excluded from using the S. & H. service as a matter of policy are those deemed inappropriate for reasons of public interest such as liquor dealers and undertakers.

The witness also noted that competition between trading stamp companies in California is very keen. Consequently, there are numerous trading stamps or trading stamp services available to retailers who wish to use this promotional device.

The franchise system is well known in the American market place and is by no means unique to the trading stamp business. Many products are distributed through franchised dealers. It is an accepted business practice and has not been regarded to be unfair or discriminatory by any enforcement agency concerned with problems of that nature.

Trading Stamp Redemption Rates Are Low

Morgan Keaton, on the subject of redemption rates, said:

> * * * This, of course, does not take into consideration the unredeemed stamps. The S. & H. people maintain they have a 95 percent redemption of their stamps. I happen to be unfortunate enough to own a little apartment house in this town and I have owned it for about 10 years and people moving out of it fail to fill their books and they throw them in the wastebasket and we have picked up hundreds of them in the last 10 years where they were thrown out. Maybe they can prove it, but I doubt it. A survey was made on this overall program that only between 60 and 70 percent of all the stamps are redeemed. * * *

John H. Stiers, President of the Fresno County Gasoline Retailers, informed the committee:

> * * * as I mentioned, I don't have them; I don't give them away, but I can say we throw a lot of them away. Every day we do a tremendous amount of lubrication and we sweep out every day stamps wadded upon the floorboards, pasted, and we have permission to get in the glove compartments and get the man's registration—I mean the names and everything for a followup card. And I can tell you they are just wadded up with just all kinds stuck on the different letters and everything which are never used, which means they are not being redeemed. It is a loss and probably a gain to the stamp companies. Our dealers have brought out that they are in favor of abolishing the use of trading stamps and premiums or gifts. Also, I don't know whether this is in line, they brought out too, if there is any of these moneys left for unredeemed stamps that it should go somewhere because actually the stamp companies have put nothing out to gain that money and it probably should go to the State. * * *

The personal experiences of these two witnesses focused the attention of the committee on the matter of redemption of trading stamps. There has been a great deal of speculation about this particular aspect of the trading stamp business. Neither of the witnesses who suggested that trading stamp redemption rates were low presented any evidence which would warrant that conclusion.

Representatives of the trading stamp companies noted that it is very difficult to obtain exact statistics on trading stamp redemptions. The difficulty arises from the fact that there are always two categories of unredeemed stamps outstanding; those that are in process of collection and they will after some period be redeemed; and those that will never be redeemed because of loss or destruction. At any given time there will always be a large number of stamps outstanding that will be redeemed. The trading stamp company that has been in business over a period of years can prove that the percentage of stamps that will never be redeemed is very small. It is impossible to compute exactly the number of stamps that will never be redeemed for the reason that the average period during which the stamp is held by a collector before it is redeemed cannot be known with any certainty. The representatives of the trading stamp companies gave the committee evidence which indicated that the percentage of stamps which are ultimately never redeemed is not significant.

The most incontrovertible evidence offered to this effect was supplied by the Sperry & Hutchinson Company. Its affidavit states that the company's federal corporate income tax returns have been audited by the Internal Revenue Service for each year since 1921 and the service has been satisfied that the ultimate rate of redemption on a national basis has been at least 95 percent of the stamps issued.

John Willow, President of the Mission Street Coupon Company, told the committee:

> " * * * We have been in business since 1912, which makes it 45 years. Our stamp redemption is between 90 and 95 percent. We

always have a reserve which is carried by United States Government Bonds for outstanding stamps and unredeemed stamps. * * *''

Two relatively new trading stamp companies indicated to the committee that during their early years of operation their rate of redemption was low. However, in recent years their rate of redemption has climbed steadily.

Ralph W. Stayton, President of the Yuletide Bonus Stamp Company, Inc., speaking on the matter of redemptions, testified:

'' * * * I have been in the business now going on 12 years, and the first year we were in business I think our redemption ran around 30 percent of the stamps we sold. The next year it was up to around 40, but after around six years you start picking up stamps from the past years. Last year we redeemed 104 percent of the stamps we sold. * * * ''

The information presented to the committee appeared to indicate that smaller and newer stamp companies have a somewhat lower redemption rate than the larger trading stamp companies who have been in operation for a longer period of time. This observation is supported by the finding of Dr. Harvey L. Vredenburg, Associate Professor of Marketing, in his study of the trading stamp industry. Dr. Vredenburg estimates that the larger trading stamp companies redeem about 95 percent of their stamps, while the smaller stamp companies redeem about 75 percent of all stamps issued.

The charge by the proponents that the rate of redemption of trading stamps is low was wholly unsubstantiated, and its value to the committee as a ground in support of the proposed legislation is somewhat doubtful.

Trading Stamp Companies Enjoy Excessive Profits at the Expense of the Retailer and the Consumer

Proponents of the proposed legislation charged that trading stamp companies were receiving excessive profits from their operations at the expense of the retailer and the consumer.

Louis Gennuso, Fresno service station operator and Field Secretary for the Fresno County Gasoline Retailers, declared:

'' * * * my views on the trading stamps go back to the old saying that you don't get something from anybody for nothing, and I think the stamp companies are doing a good successful job of that; they are getting plenty for nothing from a lot of them. They don't have a tangible item to sell, only a stamp with glue on the back of them and they in turn are buying premiums, probably. I don't know. I can't challenge the cost of the premiums but nevertheless they are making a huge amount of profit. And I don't know what they pay the State in licenses. I am a little bit in the dark in respect to that, but I know it doesn't even begin to be a drop in the bucket, comparatively, from the profit they take from the State.''

No evidence was offered to support the charges by Mr. Gennuso nor the similar charges made by several other witnesses.

The representatives of the trading stamp companies were most co-operative in providing the committee with information about the profits of the companies they represented, despite the presence of competitors in the hearing room.

I. K. Sibole, Assistant to the President of the John Breuner Company of Sacramento, testified:

"* * * One accusation frequently leveled at trading stamp plans, namely, that they make inordinate profits for their operators, simply does not apply to cash checks. I have already stated that cash checks are sold to stores at $3.75 per thousand, and that their redemption value is $3.78 per thousand.

"On top of that, Breuner's absorbs the cost of printing the stamps and books, handling the redemptions, and for all promotional advertising. The co-operating merchant is not cheated—every penny he pays for cash checks, and more, is returned to his customers in valuable merchandise or service.

"Why does Breuner's operate the cash check plan?

"The basic answer to this question should be apparent to everyone. Breuner's went into the cash check business 50 years ago to create more sales volume, and to increase its profits. It has stayed with the plan because the experience of all those years has demonstrated its value as an advertising medium in the Sacramento area, and later, in the Stockton area. Since it must pay all the cost of maintaining cash checks, the company has certainly benefited by increased volume, otherwise it could not afford to continue the plan. * * * "

Burleigh Pattee, speaking for the Sperry & Hutchinson Company, stated:

"* * * First, I wish to discuss the profits of the Sperry & Hutchinson Company. I think it fair to state that Mr. Keaton, by reference to magazine articles as well as to the gross annual sales in California in the grocery business and other fields, has by innuendo charged that trading stamp companies enjoy outrageously excessive profits from their operations. Witness Bohlken, who this committee I am sure will remember, was the druggist representative in San Francisco, referred to what he loosely described as a "take" in obviously ridiculous figures, but made no mention as to what part of this was profit nor the source of his information. I wish to emphatically dispute any such charge of excessive take or profit * * *

There is no basis whatsoever for the charge of excessive profits, nor is there any reason for confusion about the financial operation of the the business operation of the Sperry & Hutchinson Company. * * *

The Sperry & Hutchinson Company is able to purchase merchandise from manufacturers at the lowest prices. The difference between these manufacturers' prices and retail prices is the margin that enables the Sperry & Hutchinson Company to carry on its business through the nation; pay its sales and other operating

expenses; to maintain its distribution system of some 500 redemption stores, 70 of which are in California, and nine distribution centers, two of which are in this State. Also out of this gross margin comes the profit which the Sperry & Hutchinson Company makes. That profit in 1956 amounted to 4.4 percent of the gross sales of the company, which is, as the members of this committee know, a small margin of profit for any well run business of this type. * * * ''

Several trading stamp company operators told the committee of the profits they realized from the conduct of that business. None of the information presented indicated excessive or extraordinary profits.

Summarily

While the proponents set forth the various principal grounds which they believed demonstrated an urgent need for anti-trading-stamp legislation, they successfully directed the attention of the subcommittee to many important aspects of the trading stamp business about which there has been a great deal of speculation.

However, an analysis of the testimony and other evidence presented by the proponents in support of the grounds set forth above suggests that the charges for the most part were unsubstantiated and in a few instances somewhat reckless.

DEFUNCT TRADING STAMP COMPANIES SUGGESTED REMEDIES

While the subcommittee was conducting its study, several letters were received from ''stamp savers'' who complained that they had accumulated stamps but were unable to redeem them because the trading stamp company which had issued them was no longer operating.

During the hearings the subcommittee was confronted with intimations and innuendos suggesting that some trading stamp companies were not financially responsible and that as a result the public could be easily victimized.

The subcommittee learned that two trading stamp companies which had been doing business in California had ceased to operate. It was suggested that their defunct condition was due to gross financial irresponsibility. There were off-the-record charges and undertones of similar content which suggested that these trading stamp companies were organized with the deliberate purpose of perpetrating a fraud upon the public. However, no factual evidence was offered that would indicate that the defunct condition of these companies was the result of any factors other than those which usually attend an ordinary business failure.

It might be well to note at this point that representatives of both companies were invited to appear and testify before the subcommittee. No response was received from either company. Their failure to respond, however, does not warrant any implication of guilt of any wrongdoing inasmuch as representatives of other trading stamp companies who were invited to appear also failed to do so.

In connection with the financial responsibility aspect of a trading stamp company's operations, the subcommittee considered the possibility of requiring such companies:

1. To maintain a sufficient reserve fund to insure the redemption of all outstanding trading stamps in the event its operations are to be terminated for any reason;

2. To acquire an adequate bond upon commencement of its business operations in California.

Many of the representatives of trading stamp companies testified at the hearings of your subcommittee that their companies as a matter of practice maintained a reserve fund which could insure proper redemption of their outstanding stamps.

The major trading stamp companies voiced no objection to the requirement that they be bonded. However, their representatives did note that such a requirement would adversely affect legitimately small trading stamp company operators.

At a public meeting of the subcommittee in Sacramento, Marvin Blanchard, Assistant Chief of the Division of Organization and Cost Control, Department of Finance, appeared and stated his department had gone into the question of bonding trading stamp companies and recommended against bonding for the following reasons:

1. The cost of becoming bonded would not keep a company from going into business. This statement was particularly aimed at the fly-by-night companies.

2. It is difficult to determine the amount of a bond which would protect the consumer.

3. It is questionable whether or not such bonding would be constitutional.

The reserve fund requirement and the bonding requirement are relatively mild forms of control of the trading stamp business. Each is worthy of further consideration if it can be clearly shown that the trading stamp business is in need of regulation, and that any constitutional obstacles can be overcome.

CONCLUSIONS AND RECOMMENDATIONS

During the course of its investigation and study your subcommittee has learned that there is a very distinct lack of evidence to support the various charges leveled at the trading stamp industry by the proponents of prohibitory or restrictive legislation. Your subcommittee has determined that the trading stamp industry is a legitimate promotional business enterprise, the conduct of which is subject to existing state laws.

If there are any aspects of the trading stamp industry's operations which adversely affect the public interest to the point where corrective legislation is required they have not been sufficiently crystallized before your subcommittee.

Accordingly, it is the recommendation of your subcommittee that no action be taken on either Assembly Bill No. 3149 or Assembly Bill No. 2162, and that no further legislation regulating the issuance and or use of trading stamps be considered until the need for it is more clearly established.

APPENDIX "A"

State v. *Dalton,* 22 R. K. 77, 46 Atl. 234 (1900)
State v. *Walker,* 105 La. 492, 29 So. 973 (1901)
Commonwealth v. *Sisson,* 178 Mass. 578, 60 N. D. 385 (1901)
People v. *Dycker,* 72 App. Div. 308, 76 N. Y. Supp. 111 (1902)
State v. *Shugart,* 138 Ala. 86, 35 So. 28 (1903)
Young v. *Commonwealth,* 101 Va. 853, 45 S. E. 327 (1903)
Ex parte Hutchinson, 137 Fed. 949 (Cir. Ct., N. D. Wash., 1904)
State v. *Ramseyer,* 73 N. H. 31, 58 Atl. 958 (1904)
Winston v. *Beeson,* 135 N. C. 271, 47 S. E. 457 (1904)
State v. *Dodge,* 76 Vt. 197, 56 Atl. 983 (1904)
Montgomery v. *Kelly,* 142 Ala. 552, 38 So. 67 (1905)
Hewin v. *Atlanta,* 121 Ga. 723, 49 S. E. 765 (1905)
People v. *Zimmerman,* 102 App. Div. 103, 92 N. Y. Supp. 497 (1905)
O'Keefe v. *Somerville,* 190 Mass. 110, 76 N. E. 457 (1906)
State v. *Sperry & Hutchinson Co.,* 110 Minn. 378, 126 N. W. 120 (1910)
Opinion of the Justices, 208 Mass. 607, 94 N. D. 843 (1911)
Sperry & Hutchinson Co. v. *Owensboro,* 151 Ky. 389, 151 S. W. 932 (1912)
State v. *Sperry & Hutchinson Co.,* 94 Neb. 785, 144 N. W. 795 (1913)

APPENDIX "B"

State v. *Wilson,* 101 Kan. 789, 168 Pac. 679 (1917)
State v. *Crosby Bros. Mercantile Co.,* 103 Kan. 733, 176 Pac. 321 (1918)
Trading Stamp Cases, 166 Wis. 613, 166 N. W. 54 (1918)
State v. *Seney Co.,* 134 Md. 437, 107 Atl. 189 (1919)
Sperry & Hutchinson v. *Weigle,* 169 Wis. 562, 173 N. W. 315 (1919)

APPENDIX "C"

Opinion of the Justices, 226 Mass. 613, 115 N. E. 978 (1917)
Denver v. *United Cigar Stores,* 68 Colo. 363, 189 Pac. 848 (1920)
United Cigar Stores v. *People,* 68 Colo. 546, 190 Pac. 1117 (1920)
State v. *Holtgreve,* 58 Utah 563, 200 Pac. 894 (1921)
Lawton v. *Stewart Dry Goods Co.,* 197 Ky. 394, 247 S. W. 14 (1923)
State v. *Lothrops-Farnham Co.,* 84 N. H. 322, 150 Atl. 551 (1930)
Sperry & Hutchinson Co. v. *Boardman,* 33 D & C 571 (Pa. 1938)
Sperry & Hutchinson Co. v. *Searl,* 287 Mich. 555, 283 N. W. 686 (1939)
People v. *Victor,* 287 Mich. 506, 283 N. W. 666 (1939)
Sperry & Hutchinson Co. v. *McBride,* 307 Mass. 408, 30 N. E. 2d 269 (1940)
Alabama Independent Service Stations Assn. v. *McDowell,* 242 Ala. 424, 6 S. 2d 502 (1942)
Alabama Independent Service Stations Assn. v. *Hunter,* 249 Ala. 403, 31 S. 2d 571 (1947)
Sperry & Hutchinson Co. v. *Margetts,* 25 N. J. Super. 568, 96 A. 2d 706, (1953); affirmed 15 N. J. 203, 104 A. 2d 310 (1954)
Loblaw, Inc. v. *Erie,* Common Pleas Court, City of Erie, Pa., Sept. 1953, not officially reported
Sperry & Hutchinson Co. v. *Hoegh,* 246 Iowa 9, 65 N. W. 2d 410 (1954)
Pendergrass v. *Hubbard,* Civil Court of Florence County, S. C., Sept. 25, 1954, not officially reported.

Public Super Markets v. *Orlando*, 8 Fla. Supp. 96 (1955)
The Sperry and Hutchinson Company v. *Birmingham*, Circuit Court, Tenth Judicial Circuit of Alabama, Equity Division 1957, not officially reported
Logan's Supermarkets, Inc. v. *Atkins*, 304 S. W. 2d 628 (1957)

APPENDIX "D"

Sperry & Hutchinson Co. v. *State*, 188 Ind. 173, 122 N.E. 584 (1919).
Opinion of the Justices, 226 Mass. 613, 115 N.E. 978 (1917).
People v. *Sperry & Hutchinson Co.*, 197 Mich. 532, 164 N.W. 503 (1917).
People v. *Dycker*, 72 App. Div. 308, 76 N.Y.S. 111 (1902).
People v. *Zimmerman*, 102 App. Div. 103, 92 N.Y.S. 497 (1905).
State v. *Dalton*, 22 R. I. 77, 46 Atl. 234 (1900).
State v. *Holtgreve*, 58 Utah 563, 200 Pac. 894 (1921).
State v. *Dodge*, 76 Vt. 197, 56 Atl. 983 (1904).
Public Super Market, et al. v. *City of Orlando*, 8 Fla. Supp. 96 (1955).
Logan's Supermarket, Inc., et al. v. *Atkins*, CCH Tenn. State Tax Rep., Para. 200-011 at pp. 100-103 (Sup. Ct. Tenn., July 1957).

APPENDIX "E"

Commonwealth v. *Sisson*, 178 Mass. 578, 60 N.E. 385 (1901).
City of Winston v. *Hudson*, 135 N. C. 286, 47 S.E. 1023 (1904).
State v. *Sperry & Hutchinson Co.*, 94 Neb. 785, 144 N.W. 795 (1913).
City Council of Montgomery v. *Kelley*, 142 Ala. 552.
Ex Parte McKenna, 126 Cal. 429.
Ex Parte Drexel and *Ex Parte Holland*, 147 Cal. 763.
Denver v. *Frueauff*, 39 Colo. 20.
Hewin v. *Atlanta*, 121 Ga. 723-731.
State v. *Sperry & Hutchinson Co.*, 110 Minn. 378.
State v. *Ramseyer*, 73 N. H. 31.
People v. *Gillson*, 109 N. Y. 389.
People v. *Dycker*, 72 App. Div. (N. Y.) 308.
People v. *Zimmerman*, 102 App. Div. (N. Y.) 103.
Winston v. *Beeson*, 135 N. C. 271.
State v. *Dalton*, 22 R. I. 77.
State v. *Dodge*, 76 Vt. 197.
Young v. *Commonwealth*, 101 Va. 853.

APPENDIX "F"

Bristol-Myers Co. v. *Lit Bros., Inc.*, 336 Pa. 81, 6 A. 2d 843 (1939).
Gever v. *American Stores*, 387 Pa. 206, 127 A. 2d 694 (1956).
Sperry & Hutchinson Co. v. *McBride*, 307 Mass. 408, 30 N.E. 2d 269 (1940).
Trade Commission v. *Bush*, Utah, 259 P. 2d 304 (1953).
Sperry & Hutchinson Co. v. *Margetts*, 15 N. J. 203, 104 A. 2d 310 (1954).
Oklahoma Retail Grocers Ass'n. v. *Safeway*, 1955 Trade Cases 68, 195 (District Court, Oklahoma County, Oklahoma, October 21, 1955).

RESOURCE MATERIAL

The subcommittee wishes to express its thanks to the contributors of the following material which was reviewed in connection with the preparation of this report.

Opinion of Legislative Counsel, re Trading Stamps (March 12, 1957).

Opinion of Legislative Counsel, re Gift Enterprise (March 13, 1957).

Opinion of Legislative Counsel, re Trading Stamps (December 13, 1957).

Opinion of Legislative Counsel, re Gift Enterprise (December 13, 1957).

Memorandum re California Assembly Bill No. 2162, courtesy of the Sperry and Hutchinson Company.

Memorandum re California Assembly Bill No. 3149, courtesy of the Sperry and Hutchinson Company.

Memorandum re Some Press-Comment about Trading Stamps, courtesy of the Sperry and Hutchinson Company (April, 1957).

Memorandum "The Legal Status of Trading Stamps," courtesy of the Sperry and Hutchinson Company.

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ASSEMBLY INTERIM COMMITTEE ON PUBLIC HEALTH

REPORT OF THE SUBCOMMITTEE ON RESTAURANT SANITATION

MEMBERS OF SUBCOMMITTEES

W. S. GRANT, *Chairman*

GEORGE G. CRAWFORD
REX M. CUNNINGHAM
CLAYTON A. DILLS
HOWARD J. THELIN

DIANA CLARKSON, *Consultant*

February, 1959

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OF THE STATE OF CALIFORNIA

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HON. JOSEPH C. SHELL
Minority Floor Leader

ARTHUR A. OHNIMUS
Chief Clerk

LETTER OF TRANSMITTAL

California Legislature
Assembly Interim Committee
on Public Health

February 9, 1959

Hon. Ralph M. Brown, *Speaker, and*
Members of the Assembly,
Assembly Chamber

Gentlemen: In accordance with the provisions of House Resolution 219 of the 1957 General Session, the Assembly Interim Committee on Public Health appointed a Subcommittee on Restaurant Sanitation to study the present California Restaurant Act and to determine whether or not new legislation was needed. Its report containing recommendations as to needed legislation is transmitted herewith.

The committee wishes to express its appreciation to the many persons and organizations, and especially the members of the Advisory Committee on Restaurant Sanitation, who have worked with the committee during this interim.

Respectfully submitted,

W. Byron Rumford, Chairman
Assembly Interim Committee
on Public Health

LETTER OF TRANSMITTAL

FEBRUARY 9, 1959

Hon. W. Byron Rumford, Chairman
Assembly Interim Committee on Public Health

DEAR MR. RUMFORD: Attached is the report of the Subcommittee on Restaurant Sanitation. This report is the result of the testimony given at public hearings and the information gathered by the subcommittee during the 1957-59 interim.

Respectfully submitted,

W. S. GRANT, Chairman
Subcommittee on
Restaurant Sanitation
GEORGE G. CRAWFORD
REX M. CUNNINGHAM
CLAYTON A. DILLS
HOWARD J. THELIN

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REPORT

INTRODUCTION

The Subcommittee on Restaurant Sanitation, appointed at the organizational meeting of the Assembly Interim Committee on Public Health on June 11, 1957, was directed to review Assembly Bill No. 1681, 1957 Regular Session, to study the present California Restaurant Act, and to make recommendations as to needed changes in that act. The committee held public hearings on October 29, 1957, in Los Angeles, and on November 12, 1957, in San Francisco. At these hearings, witnesses representing the California State Department of Public Health, city and county health departments, industry, and labor testified as to the need for revision of the existing act.

ADVISORY COMMITTEE

An advisory committee was appointed after the November 12th hearing in San Francisco to assist the subcommittee in determining the type revision that was necessary. The following, representing organizations as indicated, were appointed to serve on the advisory committee:

R. L. Tarbett, Sanitary Engineer, State Department of Public Health, Chairman
Eugene M. Howell, Public Health Engineer, San Mateo County Health Department, State Department of Public Health
Robert M. Riley, Secretary, California State Restaurant Association
David Rubenstein, Attorney, California State Restaurant Association
William R. Sweeney, Attorney, Industrial Catering Association
George Balch (alternate), Industrial Catering Association
J. B. Askew, M.D., Health Officer, California Conference of Local Health Officers
James Harrison, M.D., Health Officer, California Conference of Local Health Officers
Anthony Anselmo, Executive Secretary, San Francisco Joint Board of Culinary Workers, Bartenders and Hotel Service Workers
William Kilpatrick, Secretary, Cooks Union, Local No. 44
Russell W. Hart, Regional Engineer, United States Public Health Service (serving in an advisory capacity)
Leroy S. Houser, Regional Milk and Food Consultant, United States Public Health Service (serving in an advisory capacity)
Jess Boyd (ex officio), vending machine industry

The advisory committee held numerous meetings throughout the State and submitted its final report and recommendations to the subcommittee on April 15, 1958. The subcommittee met with the advisory committee on June 11, 1958, in San Francisco to review proposed legislation.

BACKGROUND

There are some 35,000 eating establishments in California serving 700,000,000 meals per year.[1] Some of these eating establishments, because they are included in the definition of "restaurant" as it appears in the California Restaurant Act, are governed by that act. Some are governed by various local ordinances. Some are governed by no sanitation requirements at all.

A special committee of the Conference of Local Health Officers and the State Department of Public Health conducted a study of the need for revision of the law prior to the 1957 Legislative Session. As a result of that study, Assembly Bill No. 1681, embodying legislation proposed by the department and approved in principle by the Conference Committee, was introduced at the 1957 session.[2] The measure was not considered adequate by many of the interested persons and organizations. Therefore, this committee was directed to study the entire problem of restaurant sanitation in California, to review the present act and to determine what type of legislation might be necessary.

---

[1] David Rubenstein, California Restaurant Association, Transcript of Public Hearings, November 12, 1957, and October 29, 1957.

[2] This measure would have, had it passed, resulted in several technical changes to the present law, including

(1) Addition of requirements for refrigeration.
(2) Addition of a requirement for both hot and cold water for handwashing.
(3) Removal of the requirement that female employees wear hair nets.
(4) Removal of the requirement for anterooms between toilet rooms and food preparation room.
(5) The definition of restaurant would have been expanded to include vehicles, churches, clubs, boardinghouses, guest homes and like organizations which sell food to the public.

PRESENT CALIFORNIA RESTAURANT ACT

The present California Restaurant Act, Chapter 11, Division 21, Health and Safety Code, was adopted in 1947. Prior to that time, there was no uniform standard or law in California on restaurant sanitation. Such programs as did exist were carried on by local health departments under the authority of county and city ordinances or general state statutes such as the Food Sanitation Act.

The present restaurant act establishes certain minimum standards for restaurant sanitation to be met by all restaurants in the State. These standards relate to such items as the sanitation of floors, walls and ceilings; lighting, ventilation, and water supplies; toilet and lavatory facilities; utensils—their cleaning and storage; garbage, contamination, and health requirements for employees. Many cities and counties have adopted their own ordinances to supplement the state act. The resulting standards and requirements vary widely from those in areas which require compliance only with the minimal state act to those areas which require compliance with a detailed and extensive local ordinance.

The act stipulates that "the director (of the Department of Public Health), inspectors, and agents appointed by the board (of Public Health) and all health officers and duly authorized agents thereof, and inspectors are charged with the enforcement of the act." (Section 28660) It further states that when the local health service enforces the minimum requirements, the enforcement "shall not be duplicated by the State Department of Public Health." (Section 28663) In effect then, primary responsibility for enforcement rests with the local health department. The state department is responsible for enforcement of the act in those areas of the State having no local program and for general surveillance to determine "satisfactory enforcement by the local authorities." (Section 28663) The state health department in interpreting these requirements stated to the committee that, "It was felt by the state health department that the best method of developing uniformity of program throughout the State was to aid the local health department through consultation and advice and not through a program of supervision or dictation; this seemed to be in accordance with the intent of the California Restaurant Act."

To implement its service to local areas, the department in 1950 developed a restaurant sanitation survey procedure at the request of local health officers to measure compliance with sanitation standards. This service has been offered to local health departments and to date 35 departments have requested that surveys be made and have received evaluation reports. Many of the departments have utilized this service on an annual basis in an attempt to measure and improve their program.

Cost of Restaurant Sanitation Program

The Department of Public Health's annual expenditure for the restaurant sanitation program has been estimated at $25,000 to $30,000 per year. This does not include the more than $20,000 spent each year by the eight counties[3] whose public health function is performed on a contract basis by the State Department of Public Health.

[3] Alpine, El Dorado, Mariposa, Modoc, Mono, Nevada, Sierra and Trinity.

Each year local health departments are spending approximately 3 million dollars for their restaurant sanitation program.[4]

Neither the Department of Public Health, the local health departments, the restaurant industry nor the restaurant workers believe the present act is adequate. The act's major shortcomings are discussed here.

THE ACT IS OUT OF DATE

The act today is identical to the act as it was passed in 1947. There have been no changes, additions, or corrections since that time. Several technical items relating to building standards, plumbing, and ventilation are inadequate and out of date. There is no requirement for hot water at handwashing facilities. Requirements relating to kitchen facilities are inadequate. No section of the present act contains any provision for the refrigeration of perishable foods. This last omission is one of the most serious. R. W. Hart, Regional Engineer, United States Public Health Service, said:

> "I feel certain that the Assembly Interim Committee on Public Health will agree that the last-named omission with regard to 'refrigeration of perishable foods' is quite serious. Usually the bacteria in food are harmless, and if this were always true there would be no reason to refrigerate food except to prevent spoilage. There is, however, no way to be sure that disease-producing bacteria have not entered the food. The likelihood of contracting disease may be increased when the food contains large numbers of disease-producing organisms or their toxins. For this reason, perishable foods should be kept cold so that any small number of disease-producing bacteria which may have entered will not be permitted to multiply or to elaborate toxins."[5]

Dr. W. Elwyn Turner, Director of Public Health, Santa Clara County Health Department, said:

> "The greater number of all food-borne disease outbreaks may be directly or indirectly traced to the lack of adequate refrigeration, yet the existing restaurant act neither requires refrigeration nor specifies a maximum refrigerating temperature. In our opinion, the statute should be amended to require mandatory refrigerated storage of cooked food or of foods eaten raw which may serve as media for bacterial growth."[6]

THE DEFINITION OF RESTAURANT IS INADEQUATE

There is general agreement that the present definition of "restaurant" is inadequate because it excludes a number of different types of eating establishments.

The act defines "restaurants" as "any coffee shop, cafeteria, short-order cafe, luncheonette, tavern, sandwich stand, soda fountain, and any other eating or drinking establishment which sells or offers for sale

[4] Letter from R. L. Tarbett, State Department of Public Health, dated May 23, 1958.
[5] Transcript of Public Hearings, November 12, 1957.
[6] Letter to committee dated September 25, 1957.

food to the public, as well as kitchens in which food or drink is prepared on the premises for sale or distribution elsewhere." (Health and Safety Code, Division 21, Chapter 11, Section 28602.)

The committee has found that the definition should be far more inclusive than it now is, and should include school cafeterias, private clubs, and catering organizations. It further believes that an adequate California act must cover itinerant restaurants, vehicles, and vending machines.

F. X. Kemp, Los Angeles County Health Department, testified at the October 29th hearing that:

> "During the calendar year of 1956, we had four extensive food poisoning outbreaks. At least two of these occurred in private clubs which are not now required to comply with the California Restaurant Act. There was no local ordinance to cover the situation; they were not under inspection; they were not under permit.[7]
>
> "If these places had been required to meet sanitation requirements, it is possible these outbreaks would have been prevented."

J. B. Askew, M.D., Director of Public Health in San Diego said:

> "There is need to control food sold to the public in such places as church clubs, boarding houses, guest homes, American plan, bazaars, private clubs, public and private schools, etc.
>
> "Most of our food poisoning outbreaks occur from food handled and sold in this type of operation. All of our citizens should receive the same protection for their public health and safety * * *."

C. M. Bingham, M.D., District Health Officer, San Joaquin Local Health District said:

> "There is need for additional statewide legislation of food preparation in labor camps. There are approximately 400 labor camps preparing food for their occupants in San Joaquin County."

One striking indication of the inadequateness of the present definition of restaurant is a look at the incidences of food poisoning in eating establishments not covered by the present definition. The following Tables 1 and 2 show the number of such cases reported in schools and labor camps from 1954 through 1957.

TABLE 1

FOOD POISONING OUTBREAKS IN SCHOOLS

Outbreaks		*Cases*	*Outbreaks*		*Cases*
1957			1955		
2	(Public school)	215	1	(College)	32
1	(College fraternity house)	31	1	(Public school)	120
1956			1954		
2	(College)	94	3	(College)	229
5	(Public school)	250	1	(Public school)	234
2	(Private school)	212	1	(Private school)	5

[7] Los Angeles city has its own restaurant sanitation ordinance which contains more detailed regulations than does the state act. Included in the ordinance is the requirement that eating establishments obtain permits from the health department.

TABLE 2

FOOD POISONING OUTBREAKS
LABOR CAMPS—1954-57

Year	*Outbreaks*	*Cases*
1957	9	237
1956	8	488
1955	12	407
1954	4	303
	33	1,435

IT IS DIFFICULT TO ENFORCE

At the present time, enforcement of the act is the responsibility of the local health departments in those cities and counties with organized health departments. In other areas of the State, enforcement is the responsibility of the State Department of Public Health.

One of the major difficulties in enforcing the present act according to the State Health Department and local health departments is that the act is ambiguous and indefinite. An example of this is the Section 28633 which requires that "All food or drink shall be so stored, displayed, dispensed, or served as to be reasonably protected from dust, dirt, flies * * * or other contamination." Another Section (28624) provides that rooms shall be "properly ventilated."

The vagueness of such terms as "reasonably protected" and "properly ventilated" makes it difficult to take action against restaurants felt by the health officer or inspector to be in violation. Health department personnel feel that more specific detail must be included in all sections of the act to enable "clear-cut enforcement."

The State Department does have the authority to "adopt and enforce rules and regulations for the execution of its duties * * *." (Section 28663.5) None, however, have ever been adopted by the State Board of Health. One reason advanced for this by the department is again that it would be difficult to enforce any regulations adopted under this provision because the act does not stipulate that "Violation of any rules of the State Board of Health shall be considered the same as the violation of a provision of this act."

Charles L. Senn, Sanitation Director of the Los Angeles City Health Department testified on October 29th that:

> "We have been having the unfortunate experience here in Los Angeles of attempting to prosecute violations of State Board of Health Rules and Regulations and being repeatedly told by our City Attorney that the Legislature has not provided any penalty for violation of State Health Regulations except in the hospital field. (Regulations adopted under the Hospital Licensing Act.) Therefore, our cases are thrown out."

That the provisions of the Restaurant Act are not enforced was demonstrated in a survey conducted by the State Department.[10]

[10] Refrigeration, though not mentioned in the act, is included in the survey because it represents such an important element of restaurant sanitation.

During the three years from 1954 through 1956 when the survey was being conducted, 3,321 restaurants in 26 health jurisdictions were surveyed. Those items which were found definitely not in accordance with the Restaurant Act are recorded in Table 3 and Table 4. Seven categories have deficiency rates of over 50 percent and 14 of the 19 categories have deficiency rates of over 25 percent.

TABLE 3

ITEMS OF SANITATION NOT IN COMPLIANCE WITH THE REQUIREMENTS OF CALIFORNIA RESTAURANT ACT AS OBSERVED IN 3,231 EATING AND DRINKING ESTABLISHMENTS SURVEYED IN 26 HEALTH DEPARTMENT JURISDICTIONS

1954-1955-1956

Section		*Number of violations*	*Percent of total*
28620	Floors	2172	67.2
28621	Walls and ceilings	1678	51.9
28622	Openings	188	5.8
28623	Lighting	588	18.2
28625	Water supply	40	1.2
28626	Toilet facilities	944	29.2
28627	Lavatories	2130	65.9
28628	Equipment	1560	48.3
28628	Utensils	1779	55.0
28629	Dishwashing	471	14.6
28629	Dish sanitizing	1615	50.0
28630	Storage utensils	925	28.6
28631	Garbage and waste	904	28.0
28633	Protection from contamination	1683	52.1
28635	Premises	2434	75.3
28650	Uniforms	1015	31.4
28650	Hands	87	2.7
28650	Hair nets	928	28.7
Not in Act	Refrigeration	1132	35.0

SOURCE: State Department of Public Health

IMPROVED SANITATION IN EATING ESTABLISHMENTS IS NECESSARY

Eugene M. Howell, reported that "Food infections are on the increase in most of California. They are definitely on the increase in San Mateo County * * *. We actually had twice as many cases reported in our county last year as we had the year before and we will probably exceed last year's reported cases this year."[11]

Data submitted to the committee by the State Department of Public Health indicate the increase in number of disease outbreaks due to food poisoning during the last four years.

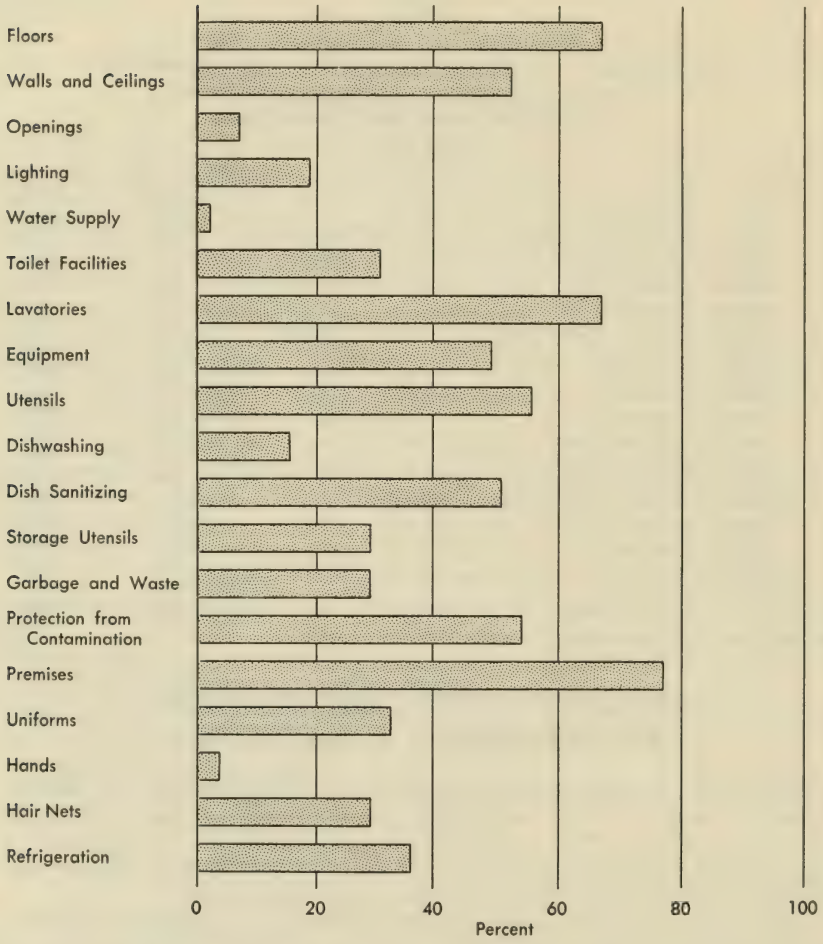
Year	*No. of disease outbreaks due to food poisoning*	*Cases involved*
1955	90	1,547
1956	103	2,158
1957	116	1,906
1958	132	3,795
	441	9,406

[11] Eugene M. Howell, San Mateo County Public Health Engineer, transcript of public hearing, November 12, 1957.

TABLE 4

ITEMS OF SANITATION NOT IN COMPLIANCE WITH THE REQUIREMENTS OF CALIFORNIA RESTAURANT ACT AS OBSERVED IN 3,231 EATING AND DRINKING ESTABLISHMENTS SURVEYED IN 26 HEALTH DEPARTMENT JURISDICTIONS

1954-1955-1956



SOURCE: Bureau of Sanitary Engineering, State Department of Public Health

The department estimates that only 3 percent of all cases are reported to the department. Each year some 100,000 persons are affected with food poisoning; 35 percent or 35,000 of these outbreaks can be traced to restaurants.

The Department of Public Health reported that during 1957 a total of 101 outbreaks of food poisoning involving 1,872 cases were reported from 17 counties. These outbreaks included from 2 to 200 cases each. In one instance three outbreaks of 317 cases occurred on the same day in three separate locations—the food was obtained from a caterer.

Approximately 35 percent of the outbreaks reported in 1957 were traced to restaurants, 23 percent were traced to homes, and approximately 9 percent each to clubs and labor camps. The remaining 24 percent included drive-ins, institutions (schools, etc.), caterers, bakeries and delicatessens. Table 5 shows the number of food poisoning outbreaks by county and source of food in 1957.[12]

Typhoid fever outbreaks are not included as food poisonings. However, it is important to note that during 1957, 13 cases of typhoid fever reported from three counties were traced to a carrier in a restaurant. Two other typhoid cases were contracted at a Los Angeles fountain from a carrier during 1957.

Poor refrigeration or no refrigeration for extended periods of time was the reason most often given for outbreaks. Other contributing factors mentioned were: low temperatures in steam tables; improper handling of food; for example, food transported in cars from one place to another; and sores or lesions on the hands or face of the food handler.

[12] A review of the outbreaks from 1954 through 1956 demonstrated the same trend. Restaurants accounted for 35 percent the same as in 1957. Homes were slightly higher with 30 percent. Labor camps accounted for approximately 8 percent, and clubs 3.4 percent. The other categories were in the same general range as they were in 1957.

TABLE 5

FOOD POISONING OUTBREAKS BY COUNTY AND SOURCE OF FOOD—1957

County	Total		Restaurant		Home		Clubs		Labor camp		Drive-in and counters		Institution[1]		Caterer		Bakery		Delicatessen		Vending machine		Picnics		Boys Camp		Market		Food factory	
	No. of outbreaks	No. of cases	O[2]	C[3]	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C
Total	101	1,872	35	216	23	273	9	280	9	242	7	27	4	245	3	317	2	4	2	10	2	4	2	231	1	11	1	2	1	10
Alameda	4	42	1	2	----	------	2	38	----	------	1	2	----	------	----	------	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Butte	1	3	----	------	1	3	----	------	----	------	----	----	----	------	----	------	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Fresno	7	71	2	17	2	25	----	------	----	------	1	2	1	17	----	------	----	----	----	----	----	----	----	----	----	----	----	----	1	10
Imperial	2	26	----	------	----	------	----	------	1	18	1	8	----	------	----	------	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Kern	1	2	----	------	----	------	----	------	----	------	----	----	----	------	----	------	----	----	----	----	1	2	----	----	----	----	----	----	----	----
Los Angeles	58	638	25	154	18	204	7	242	----	------	4	15	1	13	----	------	1	2	1	6	1	2	----	----	----	----	----	----	----	----
Marin	3	12	1	6	----	------	----	------	----	----	----	----	----	------	----	------	1	2	1	4	----	----	----	----	----	----	----	----	----	----
Monterey	2	19	1	3	----	------	----	------	1	16	----	----	----	------	----	------	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Riverside	1	2	1	2	----	------	----	------	----	----	----	----	----	------	----	------	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Sacramento	2	231	----	------	----	------	----	------	----	----	----	----	----	------	----	------	----	----	----	----	----	----	2	231	----	----	----	----	----	----
San Francisco	3	10	2	8	----	------	----	------	----	----	----	----	----	------	----	------	----	----	----	----	----	----	----	----	----	----	1	2	----	----
San Joaquin	7	456	1	8	----	------	----	------	3	131	----	----	----	------	3	[4]317	----	----	----	----	----	----	----	----	----	----	----	----	----	----
San Mateo	4	175	1	16	[5]2	41	----	------	----	------	----	----	1	118	----	------	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Santa Barbara	1	11	----	------	----	------	----	------	----	----	----	----	----	------	----	------	----	----	----	----	----	----	----	----	1	11	----	----	----	----
Santa Clara	1	97	----	------	[5]	------	----	------	----	----	----	----	1	97	----	------	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Solano	3	61	----	------	----	------	----	------	3	61	----	----	----	------	----	------	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Yolo	1	16	----	------	----	------	----	------	1	16	----	----	----	------	----	------	----	----	----	----	----	----	----	----	----	----	----	----	----	----

[1] Includes Schools, Hospitals and Children's Homes.
[2] O—Outbreaks
[3] C—Cases
[4] 11 Counties—Alameda, Fresno, Humboldt, Merced, San Francisco, San Mateo, Santa Clara, Santa Cruz, Stanislaus, Sonoma and San Joaquin. Catering establishment located in San Joaquin.
[5] San Mateo and Santa Clara—1 outbreak 36 cases—outbreak occurred in San Mateo County.
Source: State Department of Public Health.

THE NEED FOR A NEW RESTAURANT ACT IS RECOGNIZED

By Local Health Officers

The subcommittee wrote the local health officers in September and asked them whether they felt that the California Restaurant Act should be revised or whether there is need for additional statewide legislation. Thirty answers were received. Twenty-nine answered "yes."

By the State Department of Public Health

"The Department would like to see the development of a California Restaurant Act which would offer to the public the assurance of safety, which will satisfy the local health officers as to enforceability, and which will not produce undue, arbitrary and unreasonable demands upon the industry itself." [13]

By the California State Restaurant Association

"The California State Restaurant Association representing the public feeding industry of the State is strongly in favor of the complete rewriting of the California Restaurant Act so that the revised Act contains as much detail as is practical.

"The necessity and need for one restaurant sanitation act is greater than ever in California due to the tremendous population increase, gradual fading away of so-called city and county boundary lines thus resulting in one metropolitan community. * * * This growth of cities, counties and communities into one area clearly demonstrates the need for one statewide restaurant act.[14]

By Labor

"We are in accord with the proposed revision of the California Restaurant Act by reason of the fact that we are directly and vitally affected by rules and laws governing not only the preparation and handling of food in a sanitary manner, but by rules and regulations affecting our health. We concur in the various expressed reasons for the necessity of revising the California Restaurant Act." [15]

By the United States Public Health Service

"In view of the public health deficiencies in the California Restaurant Act, we concur with the aims of the restaurant industry, health authorities, and consumers to secure revision of the present act. In fact, we feel that if they did not make this effort, both industry and officialdom alike would be open to considerable criticism for not taking all necessary precautions to protect the health of the public. * * *

"We recommend that the Assembly Interim Committee on Public Health take due cognizance of the desires of the restaurant industry and the official agencies, both state and local, to improve the restaurant act of the State to the end that the 'eating out' public may be assured the optimum in health protection." [16]

[13] Dr. Frederic M. Kriele, Deputy Director, State Department of Public Health. Transcript, public hearing, November 12, 1957.
[14] Robert M. Riley, Secretary, California State Restaurant Association. Transcripts, public hearings, October 29, 1957, p. 16-17; November 12, 1957.
[15] *Ibid.* William Kilpatrick, Secretary, Cooks Union, Local No. 44.
[16] *Ibid.* Russell W. Hart, Regional Engineer, United States Public Health Service.

PROPOSED LEGISLATION

Early in the committee's study it was apparent that there was general agreement as to the need for revision of the California Restaurant Act. However, there were significant disagreements as to the type of revision necessary. The State Department of Public Health advocated a law containing a general statement of purpose, leaving the details for departmental rules and regulations. The restaurant industry wished to have the details spelled out in the general law reducing to a minimum the number of sections that would need to be clarified by rules and regulations.

The advisory committee resolved this major disagreement and the disagreements which existed over the many technical requirements which should be contained in the law. It recommended the enactment of an entirely new California Restaurant Act which incorporates requirements for sanitation in eating establishments that are believed at this time to be essential for protecting the public health.

This measure provides for:

1. A more inclusive definition of restaurant
2. Separate definitions for itinerant restaurants, vehicles and vending machines.
3. Specific and detailed sanitation requirements for each of the classifications of eating establishment.

The committee recommends the enactment of this California Restaurant Act, a copy of which is appended, at the 1959 Session.

CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 1256

Introduced by Messrs. Grant, Rumford, Cunningham, Crawford, and Dills

February 9, 1959

REFERRED TO COMMITTEE ON PUBLIC HEALTH

An act to repeal Chapter 11 (commencing at Section 28600) of Division 21 of, and to add Chapter 11 (commencing at Section 28520) to Division 21 of, the Health and Safety Code, relating to sanitation and health requirements for restaurants, itinerant restaurants, vehicles, and vending machines.

The people of the State of California do enact as follows:

SECTION 1. Chapter 11 (commencing at Section 28600) of Division 21 of the Health and Safety Code is repealed.

SEC. 2. Chapter 11 (commencing at Section 28520) is added to Division 21 of said code, to read:

CHAPTER 11. SANITATION OF RESTAURANTS, ITINERANT RESTAURANTS, VEHICLES AND VENDING MACHINES

Article 1. Definitions and General Provisions

28520. This chapter is known as the "California Restaurant Act."

28521. Unless the context otherwise requires, the definitions set forth in this article govern the construction of this chapter.

28522. "Restaurant" means any coffeeshop, cafeteria, short order cafe, luncheonette, tavern, cocktail lounge, sandwich stand, soda fountain, private and public school cafeteria or eating establishment, in-plant or employee eating establishments, and any other eating establishment, whether private or public, organization, club, including veterans' club, boardinghouse, guesthouse, or political subdivision, which gives, sells, or offers for sale, food to the public, guests, patrons, members or employees as well as kitchens in which food is prepared on the premises for serving elsewhere, including catering functions. The term "restau-

rant'' shall not include itinerant restaurants, vending machines, vehicles, or private homes.

28523. ''Itinerant restaurant'' means any restaurant, operating from temporary facilities, serving, offering for sale, selling, or giving away food or beverage, and includes, but is not limited to, a restaurant where only wrapped sandwiches or other wrapped and packaged, ready-to-eat foods are served, and any mobile unit on which food is prepared and served.

28524. ''Vehicle'' means any vehicle upon which food or beverage is displayed, sold, or offered for sale, or given away.

28525. ''Vending machine'' means any self-service device offered for public use, which, upon insertion of a coin, coins, or token, or by other means, dispenses unit servings of food or beverage, either in bulk or in package, without the necessity of replenishing the device between each vending operation, but not including devices dispensing peanuts, wrapped candy, and gum exclusively.

28526. ''Machine location'' means the room, enclosure, space, or area where one or more vending machines are installed and operated.

28527. ''Food or beverage'' includes all articles used for food, drink, confectionery or condiment, whether simple or compound, and all substances and ingredients used in the preparation thereof for human consumption.

28528. ''Employee'' means any person working in an operation covered by this chapter.

28529. ''Utensils'' includes any kitchenware, tableware, glasses, cutlery, containers, implements, or other equipment with which food or beverage comes in contact during storage, display, preparation, or serving.

28530. ''Single service article'' means any utensil, container, implement, or wrapper intended for use only once in the preparation, storage, display, service, or consumption of food or beverage.

28531. ''Product contact surface'' means any surface of the vending machine, appurtenances, or containers which comes into direct contact with any food, beverage, or ingredient.

28532. ''New,'' as used in reference to new restaurants or new equipment, applies to restaurants constructed or machines or equipment installed after the effective date of the act enacted at the 1959 Regular Session of the Legislature adding this chapter.

28533. ''Person'' means natural person, club, including veterans' club, firm, corporation, partnership, organization, association, or political subdivision.

28534. ''Local health officer'' means the city, county, or district health officer having jurisdiction over an operation covered by this chapter.

Article 2. Sanitation Requirements for Restaurants

28540. The floor surfaces in all rooms in which food or beverage is stored or prepared, utensils are washed, or refuse or garbage is stored, and the floor surfaces of toilet, dressing, or locker rooms and of walk-in

refrigerators, shall be of such construction and material as to be easily cleaned. They shall be smooth, in good repair, and kept clean.

The floors of rooms in which food or beverage is served shall be clean and kept in good repair. The use of sawdust on floors of food preparation rooms is prohibited.

28541. The walls and ceilings of all kitchens shall be of light-colored, smooth, washable material and kept clean and in good repair. The walls and ceilings of food storage rooms and toilet rooms shall be of such construction as to be easily cleaned and shall be kept clean and in good repair. Cracks, holes, or loose-fitting metals or other linings that might provide vermin harborage or unsanitary conditions shall be eliminated.

This section shall not be applicable to storage rooms where foods or beverages in unopened bottles, cans, cartons, sacks, or other original shipping containers, are stored, but such storage rooms shall be kept free from vermin and in a sanitary condition.

28542. Exposed studs and rafters are prohibited on walls and ceilings of food preparation areas, areas where utensils are washed, and toilet rooms. Walls and ceilings of all rooms shall be cleaned as often as is necessary to maintain them in a clean condition. In rooms or areas where food is prepared, or where utensils are washed, acoustical tile may be used, if it is not installed less than six feet above the floor and where used it complies with all applicable requirements of this section and Section 28541.

28543. All restaurants shall be so equipped, maintained, and operated as to control the entrance, harborage and breeding of vermin, including flies. When flies or other vermin are present, effective control measures shall be instituted for their control or elimination.

28544. Light shall be provided in all areas and rooms of a restaurant. The working surfaces in rooms or areas in which food or beverages are prepared or in which utensils are washed shall be provided with at least 10 foot-candles of light. Food and utensil storage rooms, and toilet and dressing rooms shall be provided with at least four foot-candles of light, as measured 30 inches above the floor.

During general cleanup activities, adequate light for efficient conduct of such activities shall be provided in the area being cleaned.

28545. Ventilation shall be provided for dissipation of disagreeable odors and condensation in all rooms of a restaurant where food or beverages are prepared, stored, or served, where utensils are washed, in garbage storage rooms, and in all toilet rooms and dressing rooms.

At or above all cooking equipment, such as ranges, griddles, ovens, deep-fat fryers, barbecues, and rotisseries, there shall be provided mechanical exhaust ventilation equipment, as required to effectively remove cooking odors, smoke, steam, grease, and vapors.

All food preparation and dishwashing areas shall have sufficient ventilation to provide a reasonable condition of comfort for the employees working there, consistent with the job performed by the employee.

28546. Hot and cold running water under pressure shall be provided in all areas in which food is prepared or utensils are washed. The water supply shall be of a safe, sanitary quality.

28547. Toilet facilities shall be provided convenient to the employees on the premises. Where there are five or more employees of different sex, separate toilets shall be provided for each sex. Toilet rooms shall

be separated from other portions of the restaurant by tight-fitting, self-closing doors.

28548. Handwashing facilities, in good repair, shall be provided for employees within or adjacent to toilet rooms and shall be equipped with hot and cold running water. Handwashing detergent or soap and single-service sanitary towels or hot-air blowers shall be provided at handwashing facilities in permanently installed dispensing devices.

No person shall begin or resume work in a restaurant after visiting the toilet without first washing his hands. Legible signs shall be posted in each toilet room directing attention to this requirement.

28549. A room or enclosure, separated from toilets or any food storage or food preparation area, shall be provided where employees shall change and store their outer garments. No employee shall dress or undress or store his clothing in any other area on the premises.

28550. All toilets, lavatory facilities, and change rooms shall be maintained in a clean and sanitary condition.

28551. Toilet paper, handwashing detergent or soap, and single-service sanitary towels or hot air blowers shall be provided at all times when the restaurant is in operation.

28552. All plumbing shall be installed and maintained so as to prevent contamination of the water supply and minimize the possibility of contamination of foods and specialized equipment used in the washing of utensils.

28553. All multiuse utensils and all show and display cases or windows, counters, shelves, tables, refrigeration equipment, sinks, dishwashing machines and other equipment or utensils used in connection with the preparation, service, and display of food, in the operation of a restaurant, shall be made of nontoxic materials and so constructed, installed, and maintained as to be readily cleaned, and shall be kept clean and in good repair.

28554. All restaurants shall have adequate facilities for the cleaning and sanitizing of all multiuse utensils.

28555. Where single-service eating and drinking utensils are used exclusively, no facilities for dishwashing are required, except that if multiuse kitchen utensils are used, then at least a two-compartment metal sink, equipped with hot and cold running water, and metal drainboards shall be required.

28556. All multiuse eating and drinking utensils shall be thoroughly cleaned and subjected to an effective bactericidal process after each usage.

28557. Where multiuse eating and drinking utensils are washed by hand, one of the following facilities shall be provided for washing and sanitization:

(a) A three-compartment metal sink with metal drainboards, where chemicals are used for sanitization.

(b) A two-compartment metal sink with metal drainboards, where hot water is used for sanitization. The rinse compartment shall be equipped with heating facilities, so insulated or separated from the wash sink as to maintain the rinse water at not less than 180 degrees Fahrenheit.

28558. A two-compartment metal sink, having metal drainboards, with a chemical sanitizer, which is in use in a restaurant on the effective date of the act enacted at the 1959 Regular Session of the Legislature adding this chapter, may be continued in use until replaced because of deterioration thereof or modernization of the premises.

In all new restaurants, or where replacement of existing equipment takes place, if the use of a chemical sanitizer is proposed, there shall be provided a three-compartment metal sink, with metal drainboards.

28559. (a) All multiuse eating and drinking utensils, when washed by hand in a three-compartment sink, shall be washed in hot water with an effective detergent until thoroughly clean. They shall then be rinsed in clear water before being immersed in a solution containing a bactericidal chemical for such time and in such concentration as shall be first approved and prescribed by the state department, provided that such process produces results equivalent to those produced by contact with a hypochlorite solution containing 100 parts per million of available chlorine for 30 seconds.

(b) All multiuse eating and drinking utensils, when washed by hand in a two-compartment sink, shall be washed in hot water with an effective detergent until thoroughly clean and then immersed for at least one-half minute (30 seconds) in clean hot water, at a temperature of at least 180 degrees Fahrenheit, as measured by a thermometer, or immersed in a solution containing a bactericidal chemical as prescribed in subdivision (a).

(c) Other methods may be used if approved by the state department.

28560. Where multiuse eating and drinking utensils are washed by machine, the machine shall be so designed, installed, and operated as to thoroughly clean and to provide an effective bactericidal rinse for all such utensils.

All new spray-type machines which are designed for a hot water bactericidal rinse shall conform to the Standard No. 3 of the National Sanitation Foundation, as amended in September, 1956, and shall be installed and operated in accordance with such standard; or such machines shall be of a type, and shall be installed and operated, as approved by the state department. The velocity, quantity, and distribution of the washwater, type and concentration of detergent used therein, and the time the utensils are exposed to the water, shall be such as to thoroughly clean the utensils. The machine shall be connected to a hot water system so installed and maintained as to continuously provide water of at least 180 degrees Fahrenheit at the connection to the machine during the required bactericidal rinse. The quantity of rinse water and the time of exposure shall be such as to provide bactericidal effectiveness equivalent to that provided by compliance with Standard No. 3 of the National Sanitation Foundation, as amended in September, 1956, or that approved by the state department.

28561. All multiuse kitchen utensils used in the preparation or serving of food or beverage shall be thoroughly cleaned after each usage or following each day's operations or as circumstances require.

28562. Where multiuse kitchen utensils are washed by hand, there shall be provided at least a two-compartment metal sink, with metal drainboards. There shall be provided hot and cold running water.

28563. In all dishwashing operations, dishes shall be scraped or rinsed prior to dishwashing.

Different methods or materials for washing or bactericidal rinsing of utensils may be used if approved by the state department as providing results equivalent to those produced by the methods required by this article.

The local health officer may test the adequacy of the bactericidal process by performing rim-counts in accordance with methods approved by the state department, and the average of such counts on eating and drinking utensils at all times after washing and before serving shall not exceed 100 colonies per utensil.

28564. Adequate and suitable space shall be provided for the storage of utensils and equipment. The storage rooms, shelves, and racks shall be constructed and installed so as to be easily cleaned. Utensils and equipment shall be so handled and stored as to be protected from contamination. Single-service utensils shall be obtained only in sanitary containers, shall be stored in a clean, dry place until used, handled in a sanitary manner, and used once only.

28565. Every restaurant shall be provided with such facilities and equipment as are necessary to properly store or dispose of all waste material.

28566. Food waste disposals, when provided, shall be connected to a public sewerage system or a private sewerage disposal system which is designed to properly collect and dispose of such waste.

28567. All food waste and rubbish containing food waste which is kept inside the restaurant prior to disposal shall be kept in tight, non-absorbent containers covered with close-fitting lids.

All food waste and rubbish containing food waste which is stored outside of the restaurant prior to collection or disposal shall be kept in rodent-proof containers covered with close-fitting lids.

All food waste and rubbish containing food waste shall be removed and disposed of in a sanitary manner as frequently as may be necessary to prevent the creation of a nuisance.

28568. Waste containers used for storing garbage shall be thoroughly washed on the inside and outside after emptying.

28569. All liquid wastes disposed of through the plumbing system of a restaurant shall discharge into the public sewerage system or into a private sewerage disposal system which satisfactorily disposes of such materials beneath the surface of the ground. Other types of private sewerage disposal systems shall be used only with the written approval of the local health officer.

28570. Adequate and suitable space shall be provided for the storage of food and beverage.

28571. Ingredients used in the preparation of foods or beverages, and all foods or beverages offered for sale, sold or served, shall be manufactured, produced, prepared, compounded, packed, stored, transported, kept for sale and served so as to be pure, free from adulteration and spoilage; shall have been obtained from approved sources, when such approval is required by law; shall otherwise be fully fit for human consumption; and shall conform to the applicable provisions of Chapter 3 (commencing at Section 26450) of this division.

No food or beverage prepared in a private home shall be used in the preparation of foods or beverages, offered for sale, sold, or given away in a restaurant.

This section shall not be construed to require temperature controls.

28572. All food or beverage shall be prepared, stored, displayed, dispensed, placed, and served so as to be protected from dust, flies, vermin, pollution by rodents, unnecessary handling, droplet infection, overhead leakage, or other contamination.

28573. No food, or food in a container, shall be stored directly on the floor. They shall be stored at least six inches above the floor, or under such other conditions as are approved by the state department.

28574. Displays of unpackaged foods, arranged for self-service to the public, shall be effectively shielded so as to intercept a direct line between the customer's mouth and the food being displayed.

28575. Except as provided in Section 28578, all readily perishable food or beverage, capable of supporting rapid and progressive growth of micro-organisms which can cause food infections or food intoxications, and which are intended to be stored or held for processing, or are to be reused on the premises, shall be maintained at or below a temperature of 50 degrees Fahrenheit. No such readily perishable food or beverage which is to be served to the consumer on the premises where prepared shall be held above such temperature for such periods of time and under such conditions which can cause food intoxication.

28576. All refrigerators shall be kept in good repair and clean. All food stored in refrigerators shall be protected from contamination. Foods that require no further preparation before service, when stored in refrigerators, shall either be covered or so placed that they are not subject to contamination from containers, unwashed fruits and vegetables, raw meats, or other contamination from above. An accurate thermometer shall be installed in all refrigerators so as to be readily visible.

28577. All frozen foods shall be kept at a temperature which will keep such food in a frozen state until ready for processing or preparation. No food which has been completely thawed and held in an uncooked state for more than three hours shall be refrozen.

28578. All readily perishable food or beverages, capable of supporting rapid and progressive growth of micro-organisms which can cause food infections or food intoxications, when being maintained for serving, or while being served in other than natural or refrigerated form, shall be kept in devices which maintain the temperature of all portions of the food or beverage above 140 degrees Fahrenheit. An accurate thermometer, suitable for measuring temperature of food, shall be kept readily available.

28579. No article of food or any beverage which has been previously served to any person or returned from any table shall be used in the preparation of other foods or beverages for human consumption.

28580. No insecticide or other poisonous substance shall be stored in any food preparation room or in any room where food products are kept, stored, or served except in a separate cabinet provided for that purpose. All poisonous substances shall be specifically and plainly labeled as to contents and hazardous use. No insecticide or rodenticide

shall be used in a manner which would cause contamination of food or utensils.

28581. No live animal, bird, or fowl shall be kept or allowed in any room where food or beverage is prepared, stored, kept, or served. This section shall not apply to dogs being used by the blind.

28582. The premises of all restaurants shall be kept clean and free, by all reasonable means, of litter and rubbish.

28583. Living and sleeping quarters shall be separated entirely, with a solid partition, from the restaurant. No couch, cot, bed, or other sleeping accommodation shall be maintained or kept in any room where food is prepared, stored, or served.

28584. Soiled linens, coats, and aprons shall be kept in containers provided for this purpose. No tablecloths, napkins, or other linen that has been used for any other purpose since laundering shall be used for wiping utensils, counters, tables, food preparation or dispensing equipment, or in connection therewith.

Article 3. Sanitation Requirements for Itinerant Restaurants

28590. The floors of all rooms or areas of an itinerant restaurant shall be of such construction as to be smooth, in good repair, and kept clean. Dust control measures shall be effected in the surrounding area to reduce the hazard of dust.

28591. The walls and ceilings of all food preparation and utensil washing areas shall be of light-colored, smooth, washable material and shall be kept clean and in good repair. If operating at public gatherings, walls and ceilings of a temporary stand may be of clean, light-colored canvas.

28592. All itinerant restaurants shall be so equipped, maintained, and operated as to effectively control the entrance, harborage, and breeding of vermin, including flies. When flies or other vermin are present, effective control measures shall be instituted for their control or elimination.

28593. Light shall be provided in all areas and rooms of an itinerant restaurant. The working surfaces in rooms or areas in which food or beverages are prepared or in which utensils are washed shall be provided with at least ten foot-candles of light. Food and utensil storage areas, if provided, shall be lighted to an intensity of four foot-candles of light, as measured 30 inches above the floor.

During general clean-up activities, adequate light for efficient conduct of such activities shall be provided in the area being cleaned.

28594. Ventilation shall be provided for dissipation of disagreeable odors and condensation in all rooms or areas of an itinerant restaurant where food or beverages are prepared, stored, or served, where utensils are washed, and in garbage storage rooms or areas.

At or above all cooking equipment, such as ranges, griddles, ovens, deep-fat fryers, barbecues, and rotisseries, there shall be provided mechanical exhaust ventilation equipment, as required to effectively remove cooking odors, smoke, steam, grease, and vapors.

28595. Hot and cold running water under pressure shall be provided in all areas in which food is prepared or utensils washed. The water supply shall be of a safe, sanitary quality.

28596. Toilet facilities shall be provided convenient to the employees. Where there are five or more employees of different sex, separate toilets shall be provided for each sex. At public gatherings, including, but not limited to, fairs, carnivals and circuses, where a number of itinerant restaurants are operating, toilets shall be provided in the ratio of at least one water closet, chemical toilet, or privy for each 15 employees.

28597. Handwashing facilities, in good repair, shall be provided for employees within or adjacent to the food preparation area and shall be equipped with hot and cold running water. Handwashing detergent or soap and single-service sanitary towels shall be provided at handwashing facilities, in permanently installed dispensing devices.

No person shall begin or resume work in an itinerant restaurant after visiting the toilet without first washing his hands. Legible signs shall be posted in each toilet room directing attention to this requirement.

28598. All toilet and lavatory facilities shall be maintained in a clean and sanitary condition.

28599. Toilet paper, handwashing detergent or soap, and towels shall be provided at all times when the itinerant restaurant is in operation.

28600. All plumbing shall be installed and maintained so as to prevent contamination of the water supply and minimize the possibility of contamination of foods and specialized equipment used in the washing of utensils.

28601. All multiuse utensils and all show and display cases or windows, counters, shelves, tables, refrigeration equipment, sinks, dishwashing machines and other equipment or utensils used in connection with the preparation, service and display of food, in the operation of an itinerant restaurant shall be made of nontoxic materials and so constructed, installed and maintained as to be readily cleaned, and shall be kept clean and in good repair.

28602. Where single-service eating and drinking articles are used exclusively, no facilities for dishwashing shall be required, except that if multiuse kitchen utensils are used, then at least a two-compartment metal sink, equipped with hot and cold running water, and metal drainboards shall be required.

28603. If multiuse eating and drinking utensils are used, the itinerant restaurant shall have adequate facilities for their cleaning and sanitizing. These utensils shall be thoroughly cleaned and subjected to an effective bactericidal process after each usage.

28604. Where multiuse eating and drinking utensils are washed by hand, one of the following facilities shall be provided for washing and sanitization:

(a) A three-compartment metal sink with metal drainboards, where chemicals are used for sanitization.

(b) A two-compartment metal sink with metal drainboards, where hot water is used for sanitization. The rinse compartment shall be equipped with heating facilities, so insulated or separated from the wash sink as to maintain the rinse water at not less than 180 degrees Fahrenheit.

28605. (a) All multiuse eating and drinking utensils, when washed by hand in a three-compartment sink, shall be washed in hot water with an effective detergent until thoroughly clean. They shall then be rinsed in clear water before being immersed in a solution containing a bactericidal chemical for such time and in such concentration as shall be first approved and prescribed by the state department, provided that such process produces results equivalent to those produced by contact with a hypochlorite solution containing 100 parts per million of available chlorine for 30 seconds.

(b) All multiuse eating and drinking utensils, when washed by hand in a two-compartment sink, shall be washed in hot water with an effective detergent until thoroughly clean, and then immersed for at least 30 seconds in clean hot water, at a temperature of at least 180 degrees Fahrenheit, as measured by a thermometer.

(c) Other methods may be used if approved by the state department.

28606. Where multiuse eating and drinking utensils are washed by machine, the machine shall be so designed, installed and operated as to thoroughly clean and to provide an effective bactericidal rinse for all such utensils.

All new spray-type machines which are designed for a hot water bactericidal rinse shall conform to the Standard No. 3 of the National Sanitation Foundation, as amended in September, 1956, and shall be installed and operated in accordance with such standard; or such machines shall be of a type, and shall be installed and operated, as approved by the state department. The velocity, quantity, and distribution of the washwater, and type and concentration of detergent used therein, and the time the utensils are exposed to the water, shall be such as to thoroughly clean the utensils. The machine shall be connected to a hot water system so installed and maintained as to continuously provide water of at least 180 degrees Fahrenheit, at the connection to the machine during the required bactericidal rinse. The quantity of rinse water and the time of exposure shall be such as to provide bactericidal effectiveness equivalent to that provided by compliance with Standard No. 3 of the National Sanitation Foundation, as amended in September, 1956, or that approved by the state department.

28607. All multiuse kitchen utensils used in the preparation or serving of food and drink shall be thoroughly cleaned after each usage or following each day's operations, or as circumstances require.

28608. In all dishwashing operations, dishes shall be scraped or rinsed prior to dishwashing.

Different methods or materials for washing or bactericidal rinsing of utensils may be used if approved by the state department as providing results equivalent to those produced by the methods required by this article. The local health officer may test the adequacy of the bactericidal process by performing rim-counts in accordance with methods approved by the state department, and the average of such counts on eating and drinking utensils at all times after washing and before serving shall not exceed 100 colonies per utensil.

28609. Adequate and suitable space shall be provided for the storage of utensils and equipment. The storage rooms, shelves, and racks shall be constructed and installed so as to be easily cleaned. Utensils and equipment shall be so handled and stored as to be protected from

contamination. Single-service utensils shall be obtained only in sanitary containers, shall be stored in a clean, dry place until used, handled in a sanitary manner, and used once daily.

28610. Every itinerant restaurant shall be provided with such facilities and equipment as are necessary to properly store or dispose of all waste material.

28611. Food waste disposals, when provided, shall be connected to a public sewerage system or a private sewerage disposal system which is designed to properly collect and and dispose of such waste.

28612. All food waste and rubbish containing food waste which is kept inside the restaurant prior to disposal shall be kept in tight, non-absorbent containers covered with close-fitting lids.

All food waste and rubbish containing food waste which is stored outside of the itinerant restaurant prior to collection or disposal shall be kept in rodent-proof containers covered with close-fitting lids.

All food waste and rubbish containing food waste shall be removed and disposed of in a sanitary manner as frequently as may be necessary to prevent the creation of a nuisance.

28613. Waste containers used for storing garbage shall be thoroughly washed on the inside and outside after emptying.

28614. All liquid wastes disposed of through the plumbing system of an itinerant restaurant shall discharge into the public sewerage system or into a private sewerage disposal system which satisfactorily disposes of such materials beneath the surface of the ground. Other types of private sewerage disposal systems shall be used only with the written approval of the local health officer.

28615. Adequate and suitable space shall be provided for the storage of food or beverage.

28616. Ingredients used in the preparation of foods or beverages, and all foods or beverages offered for sale, sold or served, shall be manufactured, produced, prepared, compounded, packed, stored, transported, kept for sale and served so as to be pure, free from adulteration and spoilage; shall have been obtained from approved sources, when such approval is required by law; shall otherwise be fully fit for human consumption; and shall conform to the applicable provisions of Chapter 3 (commencing at Section 26450) of this Division.

No food or beverage prepared in a private home shall be used in the preparation of foods or beverages, offered for sale, sold or given away in an itinerant restaurant.

This section shall not be construed to require temperature controls.

28617. All food or beverage shall be prepared, stored, displayed, dispensed, placed, and served so as to be protected from dust, flies, vermin, pollution by rodents, unnecessary handling, droplet infection, overhead leakage, or other contamination.

28618. No food, or food in a container, shall be stored directly on the floor. They shall be stored at least six inches above the floor, or under such other conditions as are approved by the state department.

28619. Displays of unpackaged foods, arranged for self-service to the public, shall be effectively shielded so as to intercept a direct line between the customer's mouth and the food being displayed.

28620. Except as provided in Section 28623 all readily perishable food or beverage, capable of supporting rapid and progressive growth

of micro-organisms which can cause food infections or food intoxications, and which are intended to be stored or held for processing, or are to be reused on the premises shall be maintained at or below a temperature of 50 degrees Fahrenheit. No such readily perishable food or beverage which is to be served to the consumer on the premises where prepared shall be held above such temperature for such periods of time and under such conditions which can cause food intoxication.

28621. All refrigerators shall be kept in good repair and clean. All food stored in refrigerators shall be protected from contamination. Foods that require no further preparation before service, when stored in refrigerators, shall either be covered or so placed that they are not subject to contamination from containers, unwashed fruits and vegetables, raw meats, or other contamination from above. An accurate thermometer shall be installed in all refrigerators so as to be readily visible.

28622. All frozen foods shall be kept at a temperature which will keep such food in a frozen state until ready for processing or preparation. No food which has been completely thawed and held in an uncooked state for more than three hours shall be refrozen.

28623. All readily perishable food or beverages, capable of supporting rapid and progressive growth of micro-organisms which can cause food infections or food intoxications, when being maintained for serving, or while being served in other than natural or refrigerated form shall be kept in devices which maintain the temperature of all portions of the food or beverage above 140 degrees Fahrenheit. An accurate thermometer, suitable for measuring temperature of food, shall be kept readily available.

28624. No article of food or any beverage which has been previously served to any person or returned from any table shall be used in the preparation of other foods or beverages for human consumption.

28625. No insecticide or other poisonous substance shall be stored in any food preparation room or in any room where food products are kept, stored, or served except in a separate cabinet provided for that purpose. All poisonous substances shall be specifically and plainly labeled as to contents and hazardous use. No insecticide or rodenticide shall be used in a manner which would cause contamination of food or utensils.

28626. No live animal, bird, or fowl shall be kept or allowed in any room where food or beverage is prepared, stored, or served. This section shall not apply to dogs being used by the blind.

28627. The itinerant restaurant and the adjacent areas of influence thereto, shall be kept clean and free, by all reasonable means, of litter and rubbish.

28628. Living and sleeping quarters shall be separated entirely, with a solid partition, from the itinerant restaurant. No couch, cot, bed, or other sleeping accommodation shall be maintained or kept in any room where food is prepared, stored, or served.

28629. Soiled linens, coats, and aprons shall be kept in containers provided for this purpose. No tablecloths, napkins, or other linen that has been used for any other purpose since laundering shall be used for wiping utensils, counters, tables, food preparation or dispensing equipment, or in connection therewith.

Article 4. Sanitation Requirements for Vehicles

28640. The name and address of the owner or operator of the vehicle shall be plainly indicated on each side of the exterior of the vehicle, in letters at least three inches high.

28641. The compartments on all vehicles in which food or beverage is displayed, sold, offered for sale, or given away shall have tightly fitted exterior doors, which when closed, enclose the compartment.

28642. The surfaces in all compartments in which food or beverage is stored, displayed, sold, offered for sale, or given away shall be of such construction and material as to be easily cleaned and to prevent vermin harborage, and shall be washable, in good repair, and kept clean. Effective control measures shall be instituted for vermin control when necessary.

28643. During cleanup activities, adequate light for efficient conduct of such activities shall be provided in the area of the vehicle being cleaned.

28644. No insecticide, rodenticide, or other poisonous material shall be stored in any food compartment, nor used in such a manner as to cause contamination of food or utensils.

28645. All utensils used for dispensing, service, and display of food or beverage and with which food or beverage comes in contact shall be so constructed, installed, and maintained as to be readily cleaned, and shall be kept clean and in good repair. Cleaning shall be done at an establishment with proper facilities, approved by the local health officer.

28646. Single-service utensils shall be obtained only in sanitary containers, shall be stored in a clean, dry place until used or placed in a closed dispenser which protects them from contamination, handled in a sanitary manner, and used once only.

28647. The vehicle operator shall maintain a suitable container for refuse. He shall be responsible for sanitation of the environs of the place of operation unless operating on private property where adequate sanitary maintenance is provided by the property owner or manager.

28648. Ingredients used in the preparation of foods or beverages, and all foods or beverages offered for sale, sold, or served, shall be manufactured, produced, prepared, compounded, packed, stored, transported, kept for sale, and served so as to be pure, free from adulteration and spoilage; shall have been obtained from approved sources, when such approval is required by law; shall otherwise be fully fit for human consumption; and conform to the applicable provisions of Chapter 3 (commencing at Section 26450) of this division.

No food or beverage prepared in a private home shall be used in the preparation of foods or beverages offered for sale, sold, or given away in a vehicle.

This section shall not be construed to require temperature controls.

28649. All food or beverages shall be wrapped, packaged, enclosed, dispensed, or handled so as to be protected from dust, flies, vermin, droplet infection, or other contamination.

28650. All readily perishable food or beverages, capable of supporting rapid and progressive growth of micro-organisms which can cause food infections or food intoxications when being maintained for serving, or being served in other than refrigerated or natural state, shall be

kept in devices which maintain the temperature of all portions of the food or drink above 140 degrees Fahrenheit. The devices shall be equipped with a thermometer showing their internal temperature.

Article 5. Sanitation Requirements for Vending Machines

28660. Foods, beverages, and ingredients intended for sale through vending machines shall be obtained from sources complying with Section 28571.

28661. All product contact surfaces of containers and equipment shall be protected from contamination.

28662. All foods, beverages, and ingredients shall be stored and packaged in clean, protected containers and handled, transported, and vended in a sanitary manner. Wet storage of packaged products is prohibited.

28663. Readily perishable foods offered for sale through vending machines shall be dispensed to the consumer in the individual, original container or wrapper into which it was placed at the commissary or at the manufacturer's or processor's plant; or such products shall be dispensed into single-service containers.

28664. In vending machines dispensing readily perishable foods, beverages, or ingredients in bulk, the bulk supplies of such foods, beverages, or ingredients shall be transferred only to a bulk vending machine container and appurtenances which are clean and have been subjected to an approved bactericidal process in accordance with Sections 28554 to 28563, inclusive.

28665. Readily perishable foods or beverages or ingredients within the vending machine shall be maintained at a temperature not higher than 50 degrees Fahrenheit or a temperature not lower than 140 degrees Fahrenheit. Vending machines dispensing readily perishable foods or beverages shall be provided with controls which insure the maintenance of these temperatures at all times. An exception may be made for the actual time required to fill or otherwise service the machine and for a maximum recovery period of 30 minutes following completion of filling or servicing operations. Such controls shall also place the machine in an inoperative condition until serviced by the operator, in the event of power failure or other condition which permits the food storage compartment to attain a temperature above 50 degrees Fahrenheit, or below 140 degrees Fahrenheit, whichever is applicable. Vending machines dispensing readily perishable foods or beverages shall be provided with a thermometer which, to an accuracy of plus or minus two degrees Fahrenheit, indicates the air temperature of the food storage compartment.

28666. Milk and fluid milk products offered for sale through vending machines shall be dispensed only in individual, original containers or from bulk containers, as approved in Section 461 of the State Agricultural Code, into which such product was placed at the milk plant. In the case of vending machines that use fluid milk products as an ingredient in hot liquid foods or beverages, such milk product may be transferred at the machine location from the individual, original container of not more than one-half gallon capacity to a vending machine bulk container which is clean and has been subjected to an approved bactericidal process in accordance with Sections 28554 to 28563, inclusive. In any such

transfer, the entire contents of the individual, original container shall be used.

28667. All multiuse parts of any bulk milk vending machine which come into direct contact with the milk or milk product shall be effectively cleaned and bactericidally treated at the milk plant. Single-service dispensing tubes which receive bactericidal treatment at the fabricating plant, and which are individually packaged in such manner as to preclude contamination, may be exempted from the above requirement.

28668. The can or other bulk milk container shall be filled only at the milk plant and sealed with two seals in such manner as to make it impossible to withdraw any part of its contents without breaking one seal, and impractical to introduce any substance without breaking the other seal. The delivery tube and any milk contact parts of the dispensing device shall be attached at the milk plant, and shall be protected by a moisture-proof covering, or by housing in a compartment with a moisture-tight closure, which covering or compartment shall not be removed until after the container is placed in the refrigerated compartment of the vending machine.

28669. With the exception of product contact surfaces of bulk milk vending machines for which separate provisions for cleaning and bactericidal treatment are specified in Section 28666, all multiuse containers or parts of vending machines which come in direct contact with readily perishable foods, beverages, or ingredients shall be removed from the machine daily and thoroughly cleaned and effectively subjected to an approved bactericidal process at the commissary or other approved facility. The requirements for daily cleaning and bactericidal treatment may be waived by the local health officer for those contact surfaces which are maintained at all times at a temperature of not higher than 50 degrees Fahrenheit or at a temperature of not lower than 140 degrees Fahrenheit, whichever is applicable. Such parts shall, after cleaning and bactericidal treatment, be protected from contamination.

28670. All parts of vending machines which come into direct contact with other than readily perishable foods, shall be thoroughly cleaned and subjected to bactericidal treatment as specified in Sections 28554 to 28563, inclusive. The frequency of the cleaning and bactericidal treatment shall be established by the local health officer, based upon the type of product being dispensed. A record of the cleaning and bactericidal treatment operations shall be maintained by the operator in each machine and shall be current for at least the past 30 days.

28671. All single-service containers which receive food or beverage from machines dispensing such products in bulk, shall be purchased in sanitary cartons or packages which protect the containers from contamination, shall be stored in a clean, dry place until used, and shall be handled in a sanitary manner. The containers shall be stored in the original carton or package in which they are placed at the point of manufacture until introduced into the container magazine or dispenser of the vending machine. The containers stored within the vending machine shall be protected from manual contact, dust, insects, rodents, and other contamination.

28672. The machine location shall be such as to minimize the potential for contamination of the product, shall be easily cleanable, and shall be kept clean.

Each vending machine shall be located in a room, area, or space which can be maintained in a clean condition and which is protected from overhead leakage from drains and piping. Each vending machine shall be so located that the space around and under the machine can be readily cleaned and so that insect and rodent harborage is not created.

The floor area upon which vending machines are located shall be reasonably smooth, of cleanable construction, and capable of withstanding repeated washing and scrubbing. This space, and the immediate surroundings of each vending machine, shall be maintained in a clean condition.

28673. The vending machines shall be of sturdy construction and the exterior construction shall be so designed, fabricated, and finished as to facilitate its being kept clean and to minimize the entrance of insects and rodents.

The exterior construction of the vending machines shall be such as to facilitate cleaning and to minimize the entrance of insects and rodents, and the exterior of the machine shall be kept clean. Service connections shall be such as to protect against unintentional or accidental interruption of service to the machine.

Door and panel access openings to the product and container storage spaces of the machine shall be tight-fitting, and, if necessary, gasketed so as to preclude the entrance of dust, moisture, insects, and rodents.

28674. All ventilation louvers or openings into vending machines shall be effectively screened against insects and rodents by screening materials of not less than 16 mesh to the inch or equivalent. An exception to this provision may be made for vending machines currently in use until such time as the machines are relocated or removed from present machine location for any other purposes.

28675. In all new machines in which a condenser unit is an integral part of the machine, such unit shall be sealed from the product and container storage spaces.

28676. Unless the vending machine is sealed to the floor so as to prevent seepage underneath or can be manually moved with ease, one or more of the following provisions shall be utilized to facilitate cleaning operation:

(a) The machine shall be mounted on legs at least six inches in height.

(b) The machine shall be mounted on casters or rollers.

(c) The machine shall be mounted on gliders which permit it to be easily moved.

28677. All service connections through an exterior wall of the machine, including water, gas, electrical, and refrigeration connections, shall be grommeted or sealed to prevent the entrance of insects or rodents. All connections to such utilities shall be such as to discourage their unauthorized or unintentional disconnection.

28678. All interior surfaces and component parts of the vending machines shall be so designed and constructed as to permit easy cleaning and shall be kept clean. All product contact surfaces of the machine shall be of smooth, nontoxic, corrosion resistant, and nonabsorbent

material, shall be capable of withstanding repeated cleaning and bactericidal treatment by normal procedures, and shall be protected against contamination.

28679. Water used in vending machines shall be from a source approved by the local health officer and shall be of a safe sanitary quality.

28680. All vending machines which dispense carbonated beverages and which are connected to a water supply system shall be equipped with two check valves or a double check valve, an air gap, a device to vent carbon dioxide to the atmosphere, or any other device approved by the local health officer, which will provide positive protection against the entrance of carbon dioxide or carbonated water into the water supply system.

Where check valves are used for the protection of a water supply system, a screen of not less than 100 mesh to the inch shall be installed in the water supply line immediately upstream from the check valves.

28681. In all vending machines which dispense carbonated beverages and which are connected to a water supply system, the ingredient water contact surfaces from the check valves or other protective device downstream, including the device itself, shall be of such material as to preclude the production of toxic substances which might result from interaction of carbon dioxide or carbonated water.

28682. The vending machine operator shall maintain a suitable container for refuse. He shall be responsible for sanitation of the environs of the place of operation unless operating on private property where adequate sanitary maintenance is provided by the property owner or manager.

28683. Containers shall be provided within all machines dispensing liquid products in bulk for the collection of drip, spillage, overflow, or other liquid wastes.

An automatic shutoff device shall be provided which will place the vending machine out of operation before such containers overflow. Containers or surfaces on which such wastes may accumulate shall be readily removable for cleaning, shall be easily cleanable, and shall be kept clean. They shall be corrosive resistant. If liquid wastes from drip, spillage, or overflow, which originate within the machine, are discharged into a sewage system, the connection to the sewer shall be through an air gap.

28684. Foods, beverages, or ingredients while in transit to vending machine locations shall be protected from the elements, dirt, dust, insects, rodents, and other contamination. Similar protection shall be provided for single-service containers, and for the product contact surfaces of equipment, containers, and devices in transit to machine locations.

Article 6. Health Requisites for Restaurants, Itinerant Restaurants, Vehicles, and Vending Machines

28686. All employees preparing, serving, or handling food shall wear clean, washable outer garments or other clean uniforms and shall keep their hands clean at all times while engaged in handling food, beverage, or utensils. All such food handlers shall wash their hands and

arms with soap or detergent and warm water before commencing work after using toilet facilities, and before returning to work, and at such other times as are necessary to prevent contamination of food.

Female employees shall wear hairnets, caps, headbands, or other suitable coverings which confine the hair. Wherever practical, employees serving food shall use tongs or other implements rather than their hands. The use of tobacco in any form by any employee while handling or serving food, beverage, or utensils is prohibited. No employee or other person shall use tobacco in any form in any room or space used primarily for the preparation of food, and the employer shall post and maintain "No Smoking" signs in such rooms or places.

28687. No person shall be employed in a restaurant, itinerant restaurant, vehicle, or in connection with a vending machine, who, in the opinion of the local health officer, is affected with, or a carrier of, any disease in a stage which is likely to be communicable to persons exposed as a result of the affected employee's normal duties as a food handler.

28688. When information as to the possibility of disease transmission is presented to the local health officer, he shall investigate conditions and take appropriate action. The health officer may, after investigation and for reasonable cause, require any or all of the following measures:

(a) The immediate exclusion of such employee or owner from the restaurant, itinerant restaurant, vehicle, or affected vending machine operation, by the health officer.

(b) The immediate closing of the restaurant, itinerant restaurant, vehicle, or affected vending machine operation, until no further danger of disease outbreak exists in the opinion of the health officer.

(c) Adequate medical examination of the owner, employee, and his coemployees, with such laboratory examination as may be indicated; or should such examination or examinations be refused, then the immediate exclusion of the refusing owner, employee, or coemployee from that or any other restaurant, itinerant restaurant, vehicle, or affected vending machine operation, until an adequate medical or laboratory examination shows that he is not affected with or a carrier of any disease in a communicable form.

Article 7. Enforcement and Inspection

28690. The director, agents, or sanitarians appointed by the director, and all local health officers, sanitarians, and duly authorized agents thereof, are charged with the enforcement of the provisions of this chapter.

28691. The director, sanitarians and agents appointed by the director, and local health officers, sanitarians, and duly authorized agents thereof, may at all reasonable times enter or inspect any restaurant, itinerant restaurant, vehicle, or vending machine, or any operation suspected of being such, for the purpose of carrying out the provisions of this chapter.

If a written report of the inspection is made, a copy shall be supplied or mailed to the operator, manager, or owner of the establishment, vehicle, or vending machine.

28692. Any person who violates any provision of this chapter is guilty of a misdemeanor. Each offense shall be punished by a fine of not less than twenty-five dollars ($25) nor more than five hundred dollars ($500), or by imprisonment in the county jail for a term not exceeding six months, or by both such fine and imprisonment.

The owner, manager, or operator of any restaurant, itinerant restaurant, vehicle, or vending machine is responsible for any violation of any provision of this chapter.

28693. The provisions of this chapter shall not prevent any city, county, or city and county from adopting standards of sanitation, health, and hygiene for restaurants, itinerant restaurants, vehicles, or vending machines more strict than those contained in this chapter, and requiring a local health permit to maintain and conduct any restaurant, itinerant restaurant, vehicle, or vending machine within such city, county, or city and county.

Whenever the enforcement of the minimum requirements of this chapter by any organized local health service is satisfactory to the state department, the enforcement of the provisions of this chapter shall not be duplicated by the state department. The state department shall investigate to determine satisfactory enforcement of this chapter by the local authorities.

28694. The state department may adopt and enforce rules and regulations for the execution of its duties under this chapter.

28695. Dining cars and other railroad rolling equipment, and commissaries serving only airlines, which are subject to the United States Public Health Service inspection, are not subject to the provisions of this chapter.

28696. The provisions of this chapter shall be printed and made available to restaurant, itinerant restaurant, vehicle, and vending machine owners by the state department.

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1957-1959

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REPORT OF THE

ASSEMBLY INTERIM COMMITTEE ON PUBLIC HEALTH
SUBCOMMITTEE ON AIR POLLUTION AND RADIATION PROTECTION

House Resolution No. 219, 1957

ATOMIC ENERGY DEVELOPMENT AND RADIATION PROTECTION IN CALIFORNIA

February, 1959

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LETTER OF TRANSMITTAL

ASSEMBLY CHAMBER, STATE CAPITOL
SACRAMENTO, February 11, 1959

HON. RALPH M. BROWN
Speaker of the Assembly, and
Members of the Assembly
Assembly Chamber, Sacramento

GENTLEMEN: The Assembly Interim Committee on Public Health submits this Report on Atomic Energy Development and Radiation Protection in California prepared by the Subcommittee on Air Pollution and Radiation Protection in accordance with House Resolution No. 219 of the 1957 Session.

Respectfully submitted,

W. BYRON RUMFORD, Chairman
Assembly Interim Committee on
Public Health

SUBCOMMITTEE LETTER OF TRANSMITTAL

ASSEMBLY CHAMBER, STATE CAPITOL
SACRAMENTO, February 11, 1959

HON. W. BYRON RUMFORD, *Chairman*
Assembly Interim Committee on Public Health

DEAR MR. RUMFORD: This is the first of two reports on the subject of atomic energy and radiation being submitted by your Subcommittee on Air Pollution and Radiation Protection. The second, submitted this same date, contains basic background information which will supplement the information contained in this report.

The subcommittee found early in its study that extensive and rapidly increasing applications of atomic energy and radiation in California present problems that are clearly a responsibility of the State. It believes that the legislation proposed herein is a necessary first step in meeting this responsibility.

The subcommittee wishes to express its appreciation to the many individuals, the representatives of industry, medicine and labor, state agencies, to the staff and faculty of the University of California whose testimony at the public hearings and whose advice and consultation throughout the interim has been of such assistance.

Respectfully submitted,

SETH J. JOHNSON, Chairman
Subcommittee on Air Pollution
and Radiation Protection
W. S. GRANT
RICHARD T. HANNA
DON MULFORD
W. BYRON RUMFORD

SCOPE OF REPORT

This Report:

1. Discusses the nature of radiation, its applications in industry, agriculture, medicine and research with special reference to the extent of the usage of radiation and atomic energy in California.

2. Describes the health hazards associated with exposure to ionizing radiation and the nature of the public health problem posed by the increasing uses of radiation in California.

3. Reviews the existing responsibility and activities of federal and state agencies in California, the problems of federal-state relationships. and the problems of state agency co-ordination of radiation regulations and control measures.

4. Discusses the need for state action and recommends legislation to meet that need.

FINDINGS

1. The extensive and rapidly increasing applications of radiation and atomic energy in California present problems which require immediate state action. Legislation is necessary to establish administrative machinery which will encourage the continuing and orderly growth of the atomic energy industry in California and which will at the same time provide for the protection of the people of California from the harmful effects of ionizing radiation.

2. The properties of radiation which make it such a valuable tool in industry, medicine, agriculture and research, make it hazardous to the individual. All radiation is harmful from a genetic point of view. It is not known whether or not there is a "safe" or threshold level below which radiation is not harmful from a somatic point of view. In light of this, the state program must be directed towards protecting the public from *all* unnecessary exposure to radiation.

3. The U. S. Atomic Energy Commission has been granted extensive authority over certain well defined areas of atomic energy and radiation which it exercises through a detailed licensure and control program. It is not clear whether or not the State has any jurisdiction in this area.

4. The majority of radiation sources in California do not come within the jurisdiction of the Atomic Energy Commission and these sources clearly comprise a state responsibility. At the present time there is no information as to the number or locations of these sources.

5. While a number of state agencies are concerned with the radiation problem and a few have undertaken radiation programs of one type or another, they are limited in scope and in most cases grossly inadequate. Further there is no definitive co-ordination either among the various state agency activities or between the State and the Federal Government.

6. There is inadequate knowledge of the amount of radiation in the environment and this knowledge is essential for the orderly development of a radiological health program.

7. The State does not have adequate laboratory facilities or enough trained personnel for conducting the type of radiation program which will be necessary in California.

RECOMMENDATIONS

Proposed legislation follows which will establish a Co-ordinator of Atomic Energy Development and Radiation Protection, and which will establish the other necessary administrative structure within the State Government to meet the problems discussed in this report.

A proposed resolution follows which requests that the U. S. Congress enact an amendment to the Atomic Energy Act of 1954 to clarify the relationships between the state and federal government with regard to the protection of the public health and safety from radiation hazards incident to the possession or use of materials or facilities regulated by the Atomic Energy Commission.

PROPOSED LEGISLATION

CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 1403

Introduced by Messrs. Johnson, Rumford, Hanna, Mulford, Bruce F. Allen, George E. Brown, Chapel, Francis, Grant, Rees, and Thelin

February 16, 1959

REFERRED TO COMMITTEE ON PUBLIC HEALTH

An act to add Chapter 7.5 (commencing at Section 25700) to Division 20 of the Health and Safety Code, relating to atomic energy development and radiation protection.

The people of the State of California do enact as follows:

SECTION 1. Chapter 7.5 (commencing at Section 25700) is added to Division 20 of the Health and Safety Code, to read:

CHAPTER 7.5. ATOMIC ENERGY DEVELOPMENT AND RADIATION PROTECTION

Article 1. Short Title

25700. This chapter may be cited and shall be known as the Califonria Atomic Energy Development and Radiation Protection Law.

LEGISLATIVE COUNSEL'S DIGEST

A. B. 1403 as introduced, Johnson (Pub. H.). Atomic energy development and radiation protection.

Adds Ch. 7.5 (commencing at Sec. 25700), Div. 20, H. & S. C.

Establishes in the Office of the Governor the position of Co-ordinator of Atomic Energy Development and Radiation Protection for the purpose of co-ordinating the activities of state agencies relating to atomic energy development and radiation protection.

Creates a Departmental Co-ordinating Committee on Atomic Energy Development and Radiation Protection to assist the co-ordinator.

Establishes an Advisory Council on Atomic Energy Development and Radiation Protection to be appointed by the Governor to advise him on matters relative to atomic energy development and radiation protection.

Makes it unlawful to manufacture, construct, produce, transfer, acquire, use, or possess any materials or facilities for which a permit or license is required by the Federal Atomic Energy Act of 1954 without first obtaining such a permit or license.

Requires any person possessing a source of radiation to register with the Department of Public Health.

Article 2. Declaration of Policy

25710. The Legislature finds and declares that the peacetime uses of atomic energy and radiation can be instrumental in improving the health, welfare and economic productivity of the people of the State of California if properly utilized, and may be hazardous to the health and safety of the public if carelessly or excessively employed. It is therefore declared to be the policy of the State to:

(a) Encourage the constructive development of industries producing or utilizing atomic energy and radiation and to eliminate unnecessary exposure of the public to ionizing radiation.

(b) Have state agencies retain their traditional jurisdictions wherever possible.

(c) Have various departments and agencies of the State which are concerned with atomic energy and radiation and its various applications develop programs designed to protect the people of the State from unnecessary exposure to radiation.

(d) Assure the co-ordination of the programs of the state agencies and the laws, rules and regulations incident thereto and to insure the co-ordination of these activities with the development and regulatory activities of local agencies, other states and the Government of the United States, including the Atomic Energy Commission.

(e) Keep the public, labor, industry, and all other legitimate interests as completely informed as possible on all matters relating to peacetime atomic energy and radiation development and control in this State.

Article 3. Definitions

25720. "Atomic energy" means all forms of energy released in the course of nuclear transformation.

25721. "Radiation" means any or all of the following forms of ionizing radiation: gamma rays, X-rays, alpha and beta particles, high-speed electrons, neutrons, protons, and other atomic or nuclear particles or rays, but does not include sound or radio waves, or visible, infrared, or ultraviolet light.

Article 4. Co-ordinator of Atomic Energy Development and Radiation Protection

25730. There is in the Office of the Governor the position of Co-ordinator of Atomic Energy Development and Radiation Protection who shall be appointed by, and serve at the pleasure of, the Governor. The co-ordinator may appoint such clerical and secretarial employees as are necessary to perform his duties and may fix their salaries, subject to the approval of the Director of Finance. The co-ordinator and his staff shall be known as the Office of Atomic Energy Development and Radiation Protection. The compensation of the co-ordinator

shall be fixed by the Director of Finance. He shall be a full-time officer and shall serve as advisor to the Governor with respect to the development of atomic energy and radiation protection in the State.

25731. The co-ordinator shall perform the liaison function between the State and the Federal Government, including the United States Atomic Energy Commission, and between this State and other states in matters pertaining to atomic energy development and radiation protection.

25732. The co-ordinator shall co-ordinate the programs, and rules and regulations of the several departments and agencies of the State relating to atomic energy development and radiation protection, and shall so far as may be practicable co-ordinate the studies conducted and the recommendations and proposals made in this State on these subjects with like activities in other states and by the Federal Government and with the policies and regulations of the United States Atomic Energy Commission.

25733. No state department or other state agency shall adopt, amend or repeal any rule or regulation, except emergency rules or regulations, relating to atomic energy development or radiation protection unless and until the proposed rule or regulation, or amendment thereto, or repeal thereof, has been first submitted to the co-ordinator for such comments, recommendations, or suggestions he may deem necessary or desirable with respect thereto.

25734. No rule or regulation applying to atomic energy development or radiation protection or amendment thereto or repeal thereof which any state agency may propose to adopt, unless it be an emergency regulation, shall be noticed under the provisions of Section 11423 of the Government Code prior to 30 days after it has been submitted to the co-ordinator.

25735. The co-ordinator may when he deems necessary or appropriate recommend to any state department or other state agency the adoption, amendment, or repeal of rules and regulations relating to atomic energy development and radiation protection.

25736. The co-ordinator shall keep the Governor and the various interested state departments and agencies informed of private and public activities affecting the peacetime uses of atomic energy and radiation and shall enlist their co-operation in protecting the health, safety and general welfare of the people of the State.

25737. The co-ordinator shall disseminate to the public factual data and information and interpretations thereof concerning atomic energy development and the uses of radiation in the State with the view to providing a reliable source of accurate information relating to the benefits and hazards of such development and uses.

25738. The co-ordinator shall submit a report to the Governor and the Legislature not later than 10 calendar days following the commencement of each regular session of the

Legislature recommending such action or legislation as he deems necessary or desirable, and shall submit his first report to the Governor and to the Legislature at the 1961 Regular Session, including but not limited to information on:

(a) The environmental monitoring and surveillance program of the State relating to radiation.

(b) The adequacy of the radiological laboratory facilities of the State necessary for discharging the duties and performing the service required by state agencies, whether or not there should be a centrally located laboratory facility to service all state agencies, and if so where it should be located administratively, or whether it would be feasible for the State to contract with private organizations for any needed technical laboratory work.

(c) The need for personnel trained in various aspects of radiological safety and a recommended program for meeting this need.

(d) A recommended program for the inspection of sources of radiation within the State.

25739. The co-ordinator may consult with and seek the advice of technically qualified persons within and without the State to advise on matters relating to atomic energy and radiation protection.

Article 5. Departmental Co-ordinating Committee

25750. There is in the State Government the Departmental Co-ordinating Committee on Atomic Energy Development and Radiation Protection which shall consist of the Co-ordinator of Atomic Energy Development and Radiation Protection as chairman and the heads of the following state departments and agencies, or the individuals designated by the heads of such departments or agencies to represent them: the Department of Public Health, the Department of Industrial Relations, the Department of Water Resources, the Department of Natural Resources, the Department of Fish and Game, the State Water Pollution Control Board, the California Disaster Office, the Attorney General, the Department of Agriculture, the Department of Public Works, the Department of Education, the Department of Finance, the University of California, the Public Utilities Commission, and such other state departments or agencies as the Governor may select.

25751. Meetings of the committee shall be held as called by the co-ordinator or upon request of four or more of the members.

25752. The committee shall assist in the co-ordination and development of the programs and activities of the various state departments and agencies in matters pertaining to atomic energy development and radiation protection and shall report thereon to the Governor from time to time or upon his request.

Article 6. Advisory Council

25760. There is in the State Government an Advisory Council on Atomic Energy Development and Radiation Protection, consisting of the Co-ordinator of Atomic Energy Development and Radiation Protection and nine members appointed by the Governor. One member shall be appointed from each of the following fields: industry, labor, medicine, education, science and technology, agriculture, insurance, city government, and county government.

25761. Members of the council shall be appointed for terms of two years and shall hold office until the appointment of their successors. The chairman shall be selected by the Governor, and the co-ordinator shall act as secretary to the council.

25762. Members of the council shall receive no compensation but shall be allowed their actual necessary traveling expenses incurred in the discharge of their duties.

25763. The council shall meet at least twice each year at the call of the Governor.

25764. The council shall advise and make recommendations to the Governor relating to atomic energy development and radiation protection.

Article 7. Permits and Licenses Required

25770. It is unlawful for any person to manufacture, construct, produce, transfer, acquire, use, or possess any of the materials or facilities for which a permit or license is required under the provisions of the Atomic Energy Act of 1954 (Public Law 85-256) unless he shall have first obtained such permit or license. Violation of this section is a misdemeanor.

25771. The Department of Public Health shall keep current information on the permits or licenses issued by the United States Atomic Energy Commission in the State and shall transmit such information to the Co-ordinator of Atomic Energy Development and Radiation Protection and upon request to any state department or agency or member of the public.

Article 8. Registration of Sources of Radiation

25780. Any person possessing a source of radiation shall register with the Department of Public Health pursuant to rules and regulations which shall be promulgated by the Board of Public Health and shall give such information relating to such source of radiation as shall be required by such rules and regulations on forms to be prescribed by the Board of Public Health and furnished by the department. Violation of this section is a misdemeanor.

25781. The information obtained by registrations under Section 25780 shall be transmitted by the department to the Co-ordinator of Atomic Energy Development and Radiation Protection and upon request to any state department or agency or member of the public.

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CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 1404

Introduced by Messrs. Johnson, Rumford, Hanna, Mulford, Bruce F. Allen, George E. Brown, Chapel, Francis, Grant, Rees, and Thelin

February 16, 1959

REFERRED TO COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

An act making an appropriation for support of the Office of Atomic Energy Development and Radiation Protection.

The people of the State of California do enact as follows:

SECTION 1. The sum of _____ dollars ($_____) is hereby appropriated out of the General Fund for support of the Office of Atomic Energy Development and Radiation Protection during the 1959-1960 Fiscal Year.

LEGISLATIVE COUNSEL'S DIGEST

A. B. 1404 as introduced, Johnson (G. E. & E.). Appropriation for support of Office of Atomic Energy Development and Radiation Protection.

Appropriates a blank amount of money from the General Fund for the support of the Office of Atomic Energy Development and Radiation Protection during the 1959-1960 Fiscal Year.

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CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

Assembly Joint Resolution No. 15

Introduced by Messrs. Johnson, Rumford, Hanna, Mulford, Bruce F. Allen, George E. Brown, Chapel, Francis, Grant, Rees, and Thelin

February 12, 1959

REFERRED TO COMMITTEE ON RULES

Assembly Joint Resolution No. 15—Relative to atomic energy and radiation protection.

WHEREAS, California is a large user of atomic energy and radioactive materials in industry, medicine, agriculture, and research; and

WHEREAS, Radiation, if improperly used, presents a potential hazard to the health and safety of the people of this State; and

WHEREAS, Since the enactment of the Atomic Energy Act of 1954 by the Federal Government there has been a considerable amount of uncertainty as to the effects of that act upon the State's traditional responsibilities in the field of health and safety; and

WHEREAS, There exists a questionable area of state jurisdiction regarding facilities and materials licensed by the United States Atomic Energy Commission which are potentially dangerous to the health and safety of human beings; and

WHEREAS, While the Atomic Energy Commission has indicated upon many occasions its desire to co-operate with the states and its desire for state assistance in inspection and enforcement, neither Congress nor the commission has clarified the relationship between the Federal Government, including the Atomic Energy Commission, and the states in this regard; now, therefore, be it

Resolved by the Assembly and Senate of the State of California, jointly, That the Legislature of the State of California respectfully memorializes the Congress of the United States to

LEGISLATIVE COUNSEL'S DIGEST

A. J. R. 15 as introduced, Johnson (Rls.). Atomic Energy Act of 1954.

Memorializes Congress to enact legislation to clarify the jurisdiction of a state with regard to the protection of the health and safety of the public from radiation hazards incident to the possession or use of facilities and materials licensed by the Atomic Energy Commission under the provision of the Atomic Energy Act of 1954.

enact an amendment to the Atomic Energy Act of 1954 which will clarify the jurisdiction of a state with regard to the protection of the health and safety of the public from radiation hazards incident to the possession or use of those facilities and materials licensed by the Atomic Energy Commission under the provisions of the Atomic Energy Act of 1954; and be it further

Resolved, That the Chief Clerk of the Assembly be hereby directed to transmit copies of this resolution to the President and Vice President of the United States, to the Speaker of the House of Representatives, and to each Senator and Representative from California in the Congress of the United States.

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INTRODUCTION

The Subcommittee on Air Pollution and Radiation Protection was appointed following adjournment of the 1957 General Session in accordance with the provisions of House Resolution No. 219. It was directed to study atomic energy and radiation usage in California, the problems relating to radiation protection and control, and to recommend legislation which might be needed in the interests of public health and safety.[1]

The subcommittee, prior to holding its first public hearing, studied the results of the work that has been done during the past years, the legislation which has been introduced during the previous legislative sessions, the laws which have been adopted by other states, and the model acts recommended by such groups as the Council of State Governments, the National Committee on Radiation Protection, and the American Public Health Association.

The first formal hearing was held by the subcommittee on February 25, 1958, in Los Angeles. The subject matter of this hearing was confined to a discussion of the existing legal authority and responsibility of various governmental agencies within California which are concerned with the control of radioactive material and a review of their activities in radiation control and regulation. The committee heard testimony from representatives of federal, state and local government agencies with a concern in the field of radiation protection.

The second hearing was held on June 9 and 10, 1958, in San Francisco. The committee heard testimony from radiation experts, from representatives of industry, the medical and dental professions, and the public on the nature and extent of the health problems posed by the increasing uses of radiation, the role the State should assume in determining, preventing, and controlling radiation hazards, and the need for a program to monitor and assess levels of radioactivity in the environment.

At its third and final hearing held in Los Angeles on October 27, 1958, the subcommittee heard additional recommendations as to the type of legislation which should be enacted in California.

During the month of March, 1958, the level of radioactivity in the rainfall in the San Francisco Bay area increased far above the "normal." During and after that period, the committee received many inquiries about this increase, and about the possibility of radioactivity in drinking water and foodstuffs. This incident illustrated the need to analyze and survey the state's facilities for the surveillance of radioactivity. A meeting of the subcommittee members with representatives of the State Department of Public Health, Department of Finance, the University of California, and the Legislative Analyst was held in Sacramento on April 8, 1958. It was decided that $13,800 would be made

[1] The subject of air pollution and the work that the committee has done in that regard is covered in a separate report. Assembly Interim Committee on Public Health, Subcommittee on Air Pollution and Radiation Protection, Vol. 9, No. 17, March, 1959.

available immediately from the Governor's Emergency Fund to enable the State Department of Public Health to hire a radiological physicist to appraise the monitoring program and to recommend the type program which should be conducted in this State.

In order to supplement this report, a second report containing some much needed background information on radiation and the atomic energy industry is being submitted under separate cover.[2] This second report, prepared for the committee by the Bureau of Public Administration, University of California, presents information on the basic concepts of nuclear physics and engineering needed for an understanding of the atomic energy industry, describes nuclear industries and the common uses of nuclear energy, describes the types of legislation adopted by other states to meet the problems posed by this new industry, and discusses various criteria for state legislation and regulation.

Following the public hearings, the subcommittee held several informal meetings to review the many recommendations made to it during the interim. The legislation proposed by the committee as a result of its study, is contained in this report.

[2] Assembly Interim Committee on Public Health, Subcommittee on Air Pollution and Radiation Protection, Volume 9, Number 15, February, 1959.

NATURE OF THE PROBLEM

WHAT IS RADIATION

An appraisal of California's need for radiation protection and control legislation requires a brief discussion of the nature of radiation, its sources, its uses and its effects.

There has always been radiation in our environment: cosmic radiation, the high energy rays which bombard the earth from outer space, and naturally occuring radioactive elements such as radium and thorium in the earth, in food and water, and within living plants and animals. Man is now and has always been exposed to this continuous and unavoidable "background" radiation.

Additional manmade sources of radiation have significantly increased man's total exposure to radiation. Manmade sources (excluding environmental contamination) include the X-rays and radioactive materials used in medicine, industry and research; and other miscellaneous sources such as radium watch dials and shoe fitting fluoroscopes. These affect only a limited or controlled environment—the doctor's office or the industrial plant.

Radioactive contamination of the environment results from nuclear weapons testing, from accidents involving the dispersion of radioactivity from waste disposal operations. In the event of a nuclear explosion or other unusual releasing of radioactive materials, the public would be exposed to radiation during the relatively short-term episode immediately following a nuclear explosion or weapons test. It would also be exposed to residual radiation, consisting of materials left near the site of the initial blast or carried to other locations in the form of fallout. The contamination of air, soil and water with some of the long-lived radioactive materials, strontium 90 for example, may result in increased levels of radiation in food, water and dairy products which could be hazardous to the public.

Radiation may also be added to the environment through the operation of atomic reactors, and through the disposal of high level radioactive wastes, a product of reactor operation. At present, low level wastes from hospitals, industries, laundries, etc., are discharged into public sewers. This radiation added to the environment in these ways is creating a problem of increasing magnitude and public health concern.

What is this radiation? It cannot, in small amounts, be seen, felt, tasted or detected without the assistance of technical instruments. Its description involves the use of highly technical terms, and concepts of nuclear physics far outside the scope of this report. Our concern here is with radiations which have the power to penetrate matter and create physical changes in the composition of the matter they strike or pass through. These radiations are commonly called ionizing radiations because they have the ability to ionize, or alter the state of other atoms.[3]

[3] "Radiation" as used throughout this report refers to ionizing radiation.

The National Academy of Science defines radioactive materials as "those naturally occuring substances such as radium, or those man-produced atoms resulting from atomic experiments, which are inherently unstable. Instead of remaining unchanged like ordinary atoms of familiar substances * * * the atoms of these radioactive substances * * * disintegrate." [4]

When such a substance disintegrates, it emits penetrating rays or radiations which possess the property of changing the chemistry of living matter by producing ionization or physical change.

Most naturally occurring elements are stable (e.g. gold, oxygen, iron). Others are not. These unstable elements including radium, uranium and thorium, are referred to as naturally occurring radioactive materials. In addition to the naturally occurring radioactive materials, normally stable elements or isotopes may be made radioactive by artificial means. Radiation, in the form of gamma rays, alpha or beta rays or particles, is produced in this way by particle accelerators, cyclotrons, nuclear reactors, etc.[5]

APPLICATIONS OF RADIATION AND ATOMIC ENERGY

There is hardly an industry today which does not use radioactive materials for research or process control. These materials are used to guage the thickness and density and to determine the wearing quality of a wide variety of products (such as rubber, metal, plastics, glass). Radioactive isotopes are used by the tobacco industry to control the quality of cigarettes; by the petroleum industry to locate the dividing line between two different liquids flowing through the same pipeline; by the plastic industry to create new materials.

It has been estimated that, in industry alone, there are more than 1,100 applications of radioactive materials which save American industry some 500 million dollars per year. The use of these materials is almost doubling every year.[6]

The potential of atomic energy as a source of electric power is now apparent. The Panel on the Impact of the Peaceful Uses of Atomic Energy estimates that "by 1975, only 15 years after the operation of the first generation of nuclear power plants, and only ten years after the start of an economically sound atomic power industry, atomic energy may be the source of over 40 million kilowatts of installed elec-

[4] National Academy of Sciences—National Research Council, *The Biological Effects of Atomic Radiation, Summary Reports*, Washington, 1956, pp. 7-8.

[5] Each atom is made up of a nucleus composed of protons and neutrons with smaller particles called electrons orbiting around it. The type of atom is determined by the relative number of these constituent parts. (Hydrogen has one electron; strontium, 38; radium, 88; and uranium, 92.) An atom is stable or in balance when the number of protons and the number of electrons is equal. A change solely in the number of neutrons does not change the chemical character of the element. Atoms with a varying number of neutrons (whether more or less than a "normal" atom) are called isotopes.

The atoms or isotopes of elements may be made radioactive by bombarding an atom with a neutron or proton or other subatomic particles. The atom looses its normal electrical balance and in the process of regaining balance, emits radioactive rays or particles until stability is reached. The time required by various radioactive substances to achieve stability or equilibrium varies over a wide range. Some take only seconds, others, millions of years. For example, thorium C has a half-life of a minute fraction of a second, while uranium 136 has a half-life of four and a half billion years. The half-life is that period of time needed for the radioactive element or isotope to decay to one-half its initial amount of radioactivity.

[6] Congressman Chet Holifield, Committee Hearing, October 27, 1958.

tric capacity, which is equal to 40 percent of the present U. S. generating capacity."[7]

In agriculture, radioactive isotopes are used extensively in research. They are used to study soil-plant relations, to trace the life cycles of plants and animals, and to study plant growth and the effect of fertilizers. The availability of radioactive materials has made possible the more efficient use of fertilizers, the development of new plant strains, and blight and pest control. Widespread research is also taking place to bring about the preservation of food by radiation. Commercial use of food products immunized from natural deterioration by radiation is anticipated within five years.

One of the principal areas in which radiation is used is medicine. Users in this field include physicians, hospitals and clinics, medical schools and medical research facilities. X-rays—perhaps the most familiar of the radiation sources—and radioactive isotopes are widely used for diagnostic, therapeutic and research purposes. For example, they are used in the diagnosis and treatment of cancer, leukemia, and disorders of the thyroid gland. In the laboratory, X-rays and radioisotopes provide vital information about the cause, control and cure of countless other diseases.

Radiation and Atomic Energy in California

Although it is impossible to know the exact extent of atomic energy and radiation usage in California, we do know that the number of uses is increasing at a rapidly multiplying rate.

In the last decade California has assumed a leading position in the atomic energy field. There are more reactors in California than in any other state. The State Department of Public Health reported that there were 32 AEC reactor licenses in California as of January 1, 1959. The University of California at Berkeley has one license; General Electric at Vallecitos has four; Aerojet-General at San Ramon, three; Aerojet-General Nucleonics at San Ramon, 19; General Dynamics Corporation at San Diego, two; while Atomics International at Canoga Park, the Naval Post-graduate School at Monterey and American Radiation and Standard Sanitary Corporation at Mountain View have one each.[8] This does not include AEC reactor experiments at Santa Susana and Livermore, nor the submarine reactors being installed by the Navy at Mare Island. Nor does it include the Department of Defense reactors which are obtained by presidential decree rather than by AEC licensure.

Two small reactors designed to generate electric power are now in operation in California. One, at Santa Susana, designed and built by the Atomic Energy Commission and Atomics International, is operated by Southern California Edison Company. The second, built jointly by General Electric and Pacific Gas and Electric Company, is located at the General Electric Vallecitos Laboratory in Pleasanton. P. G. & E. plans to have a full-scale commercial plant in operation by 1962 near

[7] The Panel on the Impact of the Peaceful Uses of Atomic Energy, Digest of the Report to Congress, Washington, 1956, p. 17.

[8] These figures do not give an accurate picture of the number of reactors in operation. For example, this is particularly true in the case of Aerojet-General Nucleonics; its 19 licenses are for reactor construction and only three are being built at any one time.

Eureka and is reported to have plans for the construction of another Northern California plant by 1965.

One indication of California's leading position in the atomic energy industry is a listing in the Buyers Guide in the November, 1958, issue of *Nucleonics*. This guide, which lists the firms throughout the country engaged in different phases of the industry, indicated that half the accelerators manufactured in the United States are manufactured in California; almost one-half of the firms offering irradiation services by accelerators are in California; one-third of those which offer reactors for sale and one-fifth of those manufacturing nuclear power plants are in California.[9]

The rate of increase in the uses and applications of radiation and atomic energy in California is partially shown by the following figures which indicate the percentage increase in the number of AEC licenses issued in California during 1958.[10]

AEC LICENSES IN CALIFORNIA—1958

Type of license	*No. of licenses* 1/1/58	12/31/58	*Percent increase*
Byproduct materials	474	621	29
Source materials	82	278	212
Special nuclear materials	32*	45	35*
Overall			66

* This figure for special nuclear material refers to the number of licenses as of March 31, 1958; percent increase is figured from that date.

The importance of radiation and atomic energy to California's continuing economic growth and well-being cannot be overemphasized. In the opinion of the committee, the state should take whatever steps it can to encourage further development of and widespread participation in the peaceful applications of this industry consistent with the health and safety of the public.

THE HEALTH EFFECTS OF RADIATION

The same properties of radiation and radioactive materials which make them such important tools in medicine, industry and research also make them potentially hazardous to the individual, the public and the environment.

The significance of radiation in terms of its health effects depends on a complex array of technical considerations outside the scope of this report. It is sufficient here to indicate a few of these considerations. Different radioactive elements have different effects on different body cells; for instance, the now familiar Strontium 90, which is chemically similar to calcium, tends to gravitate or concentrate itself in the bones as does calcium. Radioactive elements differ from one another on the basis of their half-life; some exist as a source of radiation for a fraction of a second, others for millions of years. Rays or particles emitted from a radioactive material have varying powers of penetration. X-rays and gamma rays have great powers of penetration. Alpha and beta particles which do not penetrate any great distance can cause extensive local damage, especially if they are ingested or inhaled.

[9] For further discussion, see Report of the Assembly Interim Committee on Public Health, Volume 9, No. 15, p. 77.

[10] Data provided by San Francisco Office of the Atomic Energy Commission.

Other factors influence the biological effects of radiation exposure. They include the magnitude and length of the radiation dose, the amount of body exposed, and the radiation source (internal or external). In addition, some body tissues are more sensitive to radiation than others. For example, the gonads, the skin, the eyes, the intestines, the blood forming tissues in the bone marrow are extremely sensitive.

Factors such as these must be considered whenever and wherever radiation is used. They must be taken into account by users of radiation in establishing adequate safety measures, in the packaging, handling and storage of radioactive material, and the disposal of radioactive wastes.

The health effects of radiation may be broken down into two broad classifications:

1. The *somatic* effects, e.g., the effects of radiation on persons directly exposed. The somatic cells receive the injury but the injury is not transmitted from one generation to another.

2. The *genetic* effects, or the effects that are transmitted from one generation to another.

Somatic Effects

It is well known that large or excessive doses of radiation are fatal. On January 1, 1959, a University of California laboratory technician employed at the Los Alamos laboratory, died "from the effects of a massive overdose of radiation while he was preparing part of a plutonium extraction process. * * * He was the third employee of the University of California Los Alamos scientific laboratory killed by radiation since 1945."[11]

We know, too, that large doses of radiation or chronic exposure to radiation may have permanent pathological effects. Illnesses may develop after long latent periods. Chronic irradiation may, according to the United Nations Scientific Committee cause leukemia, bone cancer, malignant tumors, a diminished resistance to infection, and a shortening of life span.[12]

Dr. John Gofman, Professor of Medical Physics at the University of California, pointing out the dangers of extremely large amounts of radiation said, "We know that very large doses of radiation given at one sitting can be deathly harmful. There is good evidence that very large doses of radiation evenly spaced can, in a small number of people, produce such long term complications as cancer and leukemia."[13]

Although we are learning more all the time about the somatic effects of radiation, a great deal remains to be learned about the effects of very small doses of radiation. Whether there is a "safe" or threshold level below which no somatic damage occurs is much debated. Dr. Gofman pointed out that we have always been exposed to a certain level of background radiation and that there is "no valid evidence based upon scientific observation to prove that natural sources of radiation have produced injury to man."[14]

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[11] *San Francisco Chronicle*, January 23, 1959.
[12] United Nations, General Assembly, *Report of the United Nations Scientific Committee on the Effects of Atomic Radiation*, Official Records: Thirteenth Session, Supplement No. 17 (A/3838), New York, 1958, p. 6.
[13] Committee Hearing, June 9, 1958.
[14] *Ibid.*

One of the problems in the scientific evaluation of very low levels of radiation stems from a lack of adequate medical statistics. In the opinion of Dr. Albert W. Bellamy, Chairman of the Department of Biophysics, U.C.L.A.: "We have not yet lived long enough at the level of radiation we are talking about to have the data. In another 20, 40, 50 or 60 years, we can say whether, and to what extent, these very low levels present a measurable hazard." [15]

With regard to low level radiation however, the United Nations Scientific Committee has stated that "as the dose of radiation is reduced below the amounts giving rise to acute functional or morphological alterations, the reactions of the organism become more difficult to detect immediately and the effects may be progressively delayed in time. Thresholds are not easily revealed under these conditions; in fact, for some of the most delayed phenomena, it is uncertain whether they exist.

> "It is a very characteristic feature of radiation injury that delayed reactions may occur many months or years following exposure. The morphological and functional alterations which occur during the long periods of latency are poorly understood. It has been shown that even after such periods acute manifestations of somatic effects may develop. * * *
>
> "Small doses of radiation given repeatedly can have a cumulative effect in those cases in which the processes of recovery and compensation are limited. * * * "

The United Nations Committee concluded that there is need for caution in the use of radiation until such time as there is a better understanding of the somatic effects of radiation.

> "At the present time, due to the fact that threshold doses for the delayed somatic effects of radiation are not exactly known, it must be recognized that the exposure of human populations to increasing levels of ionizing radiation may cause considerable and widespread somatic damage." [16]

Genetic Effects

It is generally agreed among scientists that any amount of radiation is harmful from a genetic or hereditary standpoint. Genes, which are found in every cell in the human body and which are transmitted from parent to child, determine an individual's physical characteristics. Every so often a gene changes or "mutates" causing a change in the organism. One cause of such mutations, the vast majority of which are harmful, is radiation—whether naturally occurring or man-made. If the radiation affects an ordinary body cell, the change is restricted to the individual receiving the radiation. If, however, it reaches the reproductive organs the resulting mutation may be passed on to succeeding generations. The National Academy of Sciences reports that "Although there are many uncertainties about details and certain numerical values, there is complete agreement among geneticists concerning a number of basic facts." These facts may be summarized as follows:

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[15] Committee Hearings, October 27, 1958.

[16] United Nations, General Assembly, *Report of the United Nations Scientific Committee on the Effects of Atomic Radiation*, Official Records: Thirteenth Session, Supplement No. 17 (A/3838), New York, 1958, p. 7.

"(1) Radiations cause mutations.

"(2) Practically all radiation-induced mutations which have effects large enough to be detected are harmful.

"(3) Any radiation dose, however small, can induce some mutations. *There is no minimum amount of radiation dose which must be exceeded before any harmful mutations occur.*

"(4) Every generation of living things acquires some mutations from natural causes (background radiation and also heat and certain chemicals). These are called 'spontaneous mutations,' and are also nearly all harmful.

"(5) Additional radiation over and above the irreducible background produces additional mutations over and above the spontaneous mutations. To the best of our present knowledge, if we increase the radiation that reaches the reproductive glands by X percent, the number of mutations caused by radiation will also be increased by X percent.

"The total dose of radiation received by a person over his reproductive lifetime is what counts. *The genetic damage done by radiation is cumulative.*

"(6) From the above five statements a very important conclusion results. It has sometimes been thought that here may be a rate (say, so much per week), at which a person can receive radiation with reasonable safety as regards certain types of direct damage to his own person. But the concept of a safe rate of radiation simply does not make sense if one is concerned with genetic damage to future generations. What counts, from the point of view of genetic damage, is not the rate; it is the total accumulated dose to the reproductive cells of the individual from the beginning of his life up to the time the child is conceived." [17]

Professor Curt Stern, geneticist, University of California, commented on the absence of a "threshold" or tolerance level:

> "If you receive a very small amount of radiation you get the same kind of hereditary changes as with a larger amount. The danger changes in direct proportion with the amount of radiation. There is no tolerance in even the smallest doses; that radiation we get from natural background produces mutations; any added radiation produces added mutations. * * * The same effect is produced whether a certain amount of radiation is received in a short time or whether it is a diluted amount spaced over a long time. The effect is cumulative."

In discussing the effects of radiation on the population, Professor Stern stated that "At present we get three to four roentgen units from natural background radiation and about the same amount from medical exposure, occupational exposure and fallout." [18]

In effect then, at the present time we all receive an average of about seven roentgen units. The National Academy of Sciences has proposed

[17] The National Academy of Sciences, National Research Council, *The Biological Effects of Atomic Radiation, A Report to the Public*, Washington, 1956, pp. 16-17.

[18] A roentgen is a unit of measurement for radiation. The figures here refer to the amount of radiation which reaches the gonads or reproductive organs from the time of conception to age 30.

that no one should receive more than 10 roentgen units from conception to age 30. Professor Stern reported that the following results could be expected if we were all to receive this proposed permissible dose of 10 roentgen units.

Of 100,000 children born (assuming the parents of each of the children had received the 10 roentgen permissible dose):

2,000 would be defective for nongenetic reasons.
2,000 would be defective for genetic reasons.
33 would be defective as a result of the radiation added to the natural background radiation.

He indicated that this estimate "may be wrong by a factor of 10 * * *. We might have 330 additional mutations rather than 33." These added mutations will be passed on to following generations. "You will not be able to put your finger on an individual case and say this unfortunate case is due to man-made radiation. However, a certain small fraction of mutations in future generations will be the result of the radiation added to the environment by man. * * * While this is not a matter of individual concern, it is a concern for the hundreds of thousands of people who are born, for the public in general." He concluded that "for this reason, the geneticist is in favor of keeping any radiation which is not necessary for medical or other reasons as low as possible."[19]

Exposure Standards

Units of measurement have been developed to describe various types and amounts of radiation.[20] Using these units of measurement, exposure standards have been established. In the 1920's when knowledge of the hazards of radioactive substances became apparent, national and international agencies were established to set standards of exposure and recommend methods of protection. The International Commission on Radiological Units and Measurement (ICRU) was first organized in 1925. In this country the National Committee on Radiation Protection (NCRP), made up of leading authorities in the radiation field and under the sponsorship of the National Bureau of Standards, has been the central source of scientific information and guidance on the measurement and fixing of standards since it was organized in 1929. The National Bureau of Standards Handbooks (Nos. 48 through 60) based on recommendations of the NCRP, set forth recommendations for radiation exposure limits or maximum permissible dose (MPD) in many areas of radiation usage.

More recently the AEC has prescribed safety standards and procedures for its licensees. In fixing safety levels above which exposure is

[19] Committee Hearings, June 9, 1958.

[20] Standard units of measurement include the *curie* (and small fractions of the curie —the millicurie, the microcurie, and the micromicrocurie) which measures the number of ionizing particles emitted by a radioactive material; the *roentgen* which describes the amount of X-ray and gamma ray radiation exposure as measured by that amount absorbed by a given quantity of air; the *rad* which measures the amount of any type of radiation absorbed by a certain unit of material; and the *rem* or *rep* which measure radiation in terms of the biological effect of specific types and energies of radiation upon different organs, or over the entire body, of man. For further description of measurement units see United Nations, General Assembly, *Report of the United Nations Scientific Committee on the Effects of Atomic Radiation*. Official Records: Thirteenth Session, Supplement No. 17 (A/3838), New York, 1958, p. 5.

prohibited, it has been guided in large part by the findings and recommendations of the NCRP.[21]

A great deal of confusion has resulted from the use of the term "maximum permissable dose" in setting standards for radiation exposure. It should be emphasized that the MPD is not synonymous with "safe" dose. The standards have been set for "the small percentage of the whole population who may be occupationally exposed. * * *"[22] For persons "outside the controlled areas but who may be exposed to radiation originating in controlled areas" the permissible level is somewhat arbitrarily adjusted downward to one-tenth the MPD for radiation workers.[23] The standards do not take into consideration the radiation dose from natural background, medical or dental exposures. Furthermore the MPD does contemplate some danger. The permissible dose "envisages the possibility of radiation injury during the lifetime of the exposed individual or in subsequent generations. * * * [It is defined as the dose] not expected to cause appreciable bodily injury to a person at any time during his lifetime." It should be pointed out that "appreciable bodily injury" means an injury which the "average person would regard as being objectionable and/or competent medical authorities would regard as being deleterious to health."[24]

The NCRP did not take into consideration possible genetic damage when setting standards. "Genetic changes possibly injurious to the race as a whole in future generations have been considered but they do not constitute the limiting factor in setting up permissible levels of occupation exposure."

Over the past 25 years, as the knowledge of radiation effects has grown, the MPD recommended by the NCRP has steadily decreased. The NCRP predicts that a "reappraisal of the situation will become necessary" in the near future and predicts that future revisions of permissible doses will again be downward.[25]

The NCRP says its recommendations are intended to serve as practical guides since they are based on presently available information and cannot be considered as permanent. "Unnecessary exposure to radiation should be avoided at all times."

A Public Health Problem

The problem of protecting the worker and the general public against unnecessary radiation is of utmost importance.

Dr. Frederic M. Kriete, Deputy Director of the State Department of Public Health, told the committee that "one of the most important problems of public health in the future will be that of proper protection against the potentially dangerous effects of ionizing radiation. * * * The major objective of a public health program must be the prevention, reduction, and where possible, the elimination of unnecessary exposure to harmful ionizing radiation.[26]

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[21] Frampton, George T. "Radiation Exposure—The Need for a National Policy," *Stanford Law Review*, Volume 10, Number 1, December, 1957, pp. 7-52.
[22] National Bureau of Standards, Addendum to Handbook 59, February, 1957, p. 2.
[23] *Ibid.*, pp. 2 and 5.
[24] National Bureau of Standards, Handbook No. 59, pp. 26-27.
[25] *Ibid.*, p. 79.
[26] Committee Hearings, October 27, 1958.

Dr. David E. Price, U. S. Public Health Service, pointed out the uniqueness of the radiation problem which demands immediate steps to insure the minimization of radiation exposure.

> "Past experience in public health has taught us that a problem usually becomes rather serious before people band together to deal with it. Only when a considerable amount of disease could be traced to polluted water did we begin to develop sewage treatment and other antipollution measures. Only when motor accidents had taken an alarming toll did citizens insist on better roads, safety devices, and various accident prevention programs.
>
> "In dealing with the health hazards of ionizing radiation, unfortunately, this traditional approach cannot promise success. The effects of ionizing radiation are cumulative and irreversible. They are subtle and may become apparent only after long delay. If we wait until there are obvious signs of radiation damage it will be too late to help the affected population or to decontaminate the polluted environment successfully. In this situation, prevention is not merely desirable, it is imperative." [27]

[27] David E. Price, M.D., "Radiation as a Public Health Problem," *Public Health Reports*, Vol. 73, No. 3, March, 1958, p. 197.

RADIATION PROTECTION AND CONTROL IN CALIFORNIA

The problem of radiation control and public safety in California is a concern of many federal, state and local agencies. While the Federal Government through the Atomic Energy Act of 1954 has a direct and controlling interest in several well defined areas of atomic energy, there are other areas that the Atomic Energy Act does not purport to include. In some, but not all of these areas, state and local agencies are engaged in programs which deal with particular aspects of the problem. The responsibilities and activities of these agencies are reviewed in the following sections.

THE FEDERAL GOVERNMENT

Atomic Energy Commission

Protecting the public from radiation is complicated by the ambiguous, dual nature of federal-state authority. The AEC, the principal regulating agency in the field of atomic energy and radiation, has been granted extensive authority which it exercises from a detailed licensure and control program. Whether the State can act in an area of federal authority is not clear. This questionable area of state jurisdiction lies in the regulation of radiation sources, byproduct materials and facilities licensed by the AEC.

It is clear however, that the state can act in those areas where the AEC has no jurisdiction. It can exercise authority over X-ray and fluoroscopic machines, nonreactor produced isotopes and naturally occurring radioactive materials, none of which are regulated by the AEC.

The sections below will outline the general areas of federal authority and the extent of the AEC's regulatory activities in California.

In 1946, the Atomic Energy Act, the first federal legislation concerning atomic energy, was enacted. This act provided for the establishment of the Atomic Energy Commission and reserved to the Federal Government the ownership of all fissionable materials and production facilities including the enriched materials or special nuclear material and the bombs, reactors and atomic propelled machines using these materials. It expressly prohibited their private ownership, production or use.[1]

In 1954 the present Atomic Energy Act was passed giving increased impetus to the private use of atomic energy. This present act, although it still reserves to the Federal Government the technical ownership of special nuclear materials and facilities for the production of fissionable materials, does provide for private ownership and operation of utiliza-

[1] The AEC was, however, granted the authority to operate government-owned facilities through private contractors and to encourage research and developmental activities through contracts and agreements with private persons. The AEC also could permit fissionable materials to be produced by private persons for research purposes in nongovernment-owned facilities under certain conditions. For history of the Atomic Energy Commission and the Manhattan District Project, see Frampton, George T., "Radiation Exposure—The Need for a National Policy," *Stanford Law Review*, Volume 10, Number 1, December, 1957.

tion facilities under government regulation. Extensive private use and handling of fissionable material used as fuel, and of radioactive byproduct materials and wastes resulting from such use, and private operation of facilities has followed the passage of this act.

The AEC retains extensive regulatory power over this private development, however. It is authorized to adopt "a whole scheme of regulation in all phases of the atomic energy industry designed to control the hazards to employees and to the public from ionizing radiation and is granted full and complete authority to deal with the radiation hazards under a system of licensing and regulation."[2]

Under the provisions of the act, anyone who wants to buy, sell, or possess materials under the jurisdiction of the commission or who wants to construct or operate nuclear reactors, must get a license from the AEC. The AEC is also authorized to regulate the activities of private agencies once they receive their licenses.

The Licensing of Materials

The materials over which the AEC has jurisdiction include:

1. *Source materials* which consist of natural uranium, thorium or any combination thereof and would include the natural ores from which atomic energy, special nuclear materials or byproduct materials may be derived.

2. *Byproduct materials*, which consist of the radioisotopes and fission products which are produced in nuclear reactors.

3. *Special nuclear material* consisting of the enriched uranium or plutonium, more compact and potent sources of energy than the natural uranium or thorium from which they are made. It is a fuel material used in atomic weapons and in nuclear reactors for the production of energy.

There are two types of AEC licenses—a general license and a specific license. *General licenses* are provided for by regulation; that is, licenses are available to anyone who meets the terms of the license as published in the Federal Register, Title 10. The kinds, quantities, and uses of material (either byproduct or source material) coming under the general license are considered by the AEC to constitute an insignificant health hazard. Although the individual does not have to file a formal application for use of these materials, he is expected to comply with AEC protection standards.

Specific licenses are required of those using larger quantities of source or byproduct material, and for anyone using special nuclear material.

The AEC requires a very detailed application from anyone obtaining a specific license. The application must include information as to the quantity, types of material which the applicant desires to possess, a description of his proposed uses, the qualifications of the applicant and his staff, including the training and experience which these people have had relevant to the types of materials and proposed uses that they plan to make, the kinds of equipment which the applicant has available to

[2] Price, Harold L., "The AEC Program for Licensing and Regulation," National Association of Manufacturers, Industrial Nuclear Development, Proceedings of a Conference, sponsored by the Nuclear Energy and Employee Health and Benefits Committees of the National Assn. of Manufacturers and by the National Industrial Council, May 21-23, 1958, New York, 1958, p. 16.

insure the safe use of the material. Included also is the requirement that the applicant describe his proposed operating safety procedure and the type of training and procedure he requires his employees to undergo and to observe. The AEC also requires information as to the applicant's proposed waste disposal procedure, including the magnitude of the waste and the composition.

A special *waste disposal license* (a type of byproduct license) is required of anyone in the waste disposal business.

Licensing of Facilities

The facilities which require licenses are called "production facilities" and "utilization facilities" and include all facilities which produce special nuclear material or use atomic energy in quantities of significance to the national defense or security or which may affect the public health and safety. The AEC issues a specific license for each facility upon individual application. The application must include a complete description of the facility and the materials that will be used in it, an evaluation of the safety of the proposed facility during normal operation and an evaluation of possible accidents. Evaluation of possible accidents must include both a description of means for preventing the accidents and information on the consequences of possible accidents.

The AEC notifies the California State Department of Public Health and the Division of Industrial Safety of the Department of Industrial Relations of every source, byproduct material and facility license it issues within the State. In addition, the AEC notifies the State of the receipt of every application for a facility license and waste disposal license and requests the applicant to get in touch with the governmental agency in the area where he proposes to operate or locate a facility.

Regulation of Licensed Activities

The commission has established basic standards applicable to all licensees. These standards, among other things, establish minimum permissible radiation dosage levels to which employees and the public can be exposed. They require that certain types of surveys be conducted and that certain types of personnel monitoring be maintained. They specify the kind of caution signs, labels and signals which are required. They require the submission of reports to the commission in case of accidental releases of radiation, and that certain records be kept of exposures of employees and the general public.

Before promulgating a regulation, the commission invites the comment of interested persons and state agencies. In addition, the AEC has established a 10-man committee of state officials to advise it in the preparation of regulations containing standards for protection against radiation. California has been represented on that committee by the Chief of the Division of Industrial Safety.

The Regulation and Inspection Program in California

Because California is such a large user of atomic energy and radiation, and because a large proportion of these activities are licensed by the AEC, it is important to know the extent of the inspectional and regulatory activities of the Commission in California.

In general the licensing program is designed to insure that users of materials or operators of facilities are capable of handling the materials or facilities for which they seek a license and that they have adequate means to prevent injury to employees and the public.

The AEC inspection activities, designed to insure compliance by licensees of the safety standards, are a responsibility of the Division of Inspection. Reactor inspections, which pose technical problems requiring specialized training and experience on the part of the inspector, are handled by the Washington office of the Division.

The greatest number of licenses in California are issued for the use of byproduct, source and special nuclear materials. All inspections of these licensees are handled by four inspectors in the San Francisco area office. Their territory encompasses, in addition to California, all of Nevada, Hawaii and some Pacific islands.

The AEC reported to the committee that, although its staff is limited and does not inspect all licensees, the agency has evaluated all licensees and concentrates its efforts on those representing the greatest potential hazards. Mr. R. W. Smith, Director of the Inspection Division in the San Francisco office, stated that the office concentrates its inspections on the "significant or major operations. * * * We schedule our inspections on the basis of need. I will grant that we cannot catch every shipment. However, our basic concern is to satisfy ourselves that the procedures laid down by the licensee appear to be adequate, and from the knowledge of the licensee, we have reason to believe that he will follow these procedures safely. Of course, this does not preclude accidents from happening." Mr. Smith added that, "in the event of an accident, licensees are required to notify our office immediately. * * * We would then come into the picture to take whatever steps might be appropriate to confine the hazard."[3]

Anyone using byproduct or source materials under the provisions of the general license is expected to comply with AEC safety standards. In practice, however, the AEC does not exercise regulatory control over these users since they do not, in the opinion of the AEC, constitute a significant health hazard. Although the commission does have the right to inspect the licensees, it does not do so. It does not know who the licensees all are or where they are located.[4]

The AEC can apply three types of penalties. There is the administrative penalty of license revocation or suspension. Second, a violation of the regulations or of the licensing and regulatory requirements in the Atomic Energy Act is a criminal offense. Third, the AEC can secure injunctive relief to enjoin threatened violations of the act. The AEC has never used the latter two methods, but has on occasion used the administrative remedies of license suspension or revocation.

In connection with the AEC's inspection process, it has been its practice to invite state representatives to accompany its inspectors whenever they go into a facility of one of their licensees. This has been helpful to both the commission and the State. The AEC reported to the committee in February, 1958, however, that, at that time, no representatives of the State were going on these inspections since the AEC was not clear who in the State should be invited.

[3] Committee Hearings, February 25, 1958.
[4] Interview with R. W. Smith, January 28, 1959.

"We are presently waiting word from the State as to whom the single point of contact will be; until we receive that we have felt it is inadvisable for the commission to try to determine which of the various state agencies should come along with us." [5]

Federal-State Relations [6]

Since the enactment of the Atomic Energy Act of 1954, there has been a considerable amount of uncertainty as to its effect on the State's traditional responsibilities in health and safety matters. The questionable area of state jurisdiction is with regard to those radiation sources and materials licensed by the AEC. Although the AEC has indicated on many occasions its desire to co-operate with the states and while it appears to welcome state assistance in inspection and enforcement, neither Congress nor the commission has clarified the relationship between the AEC and the states in this regard.

The AEC proposed an amendment to the 1954 act to resolve some of the unanswered questions. The proposal, sent by the commission to the Joint Congressional Committee on Atomic Energy in the summer of 1957, is still under study.[7]

The Joint Federal-State Action Committee in their December, 1957, report to the President stated that "the * * * committee agrees that a greater share of the responsibility for the promotion and regulation of the peacetime uses of atomic energy, particularly in the fields of health and safety, should be vested in the state government."

The committee also urged that the AEC act be amended to, among other things, "include a specific statement recognizing the power of the states to adopt, inspect against, and enforce standards, not in conflict with those adopted by the Federal Government, for the protection of the public health and safety." It is their proposal, "That the Atomic Energy Act of 1954 be amended in several respects to clarify the roles of the Federal and State Governments to make possible the assumption of greater responsibilities by the states in the future promotion and regulation of the peacetime uses of atomic energy, and that the states make such changes in their laws, regulations, and organization as necessary to assume increased responsibility." [8]

The problem of federal vs. state responsibility was described as follows by Albert W. Harris, Jr., Deputy Attorney General of the State of California.

> "It seems curious to suggest that a state has no authority over the disposal of radioactive wastes in the sea involving effects with respect to health on the shores of the state and associated effects on wildlife. Similarly, it is hard to believe that a state is without control over the proposed storage of wastes in an abondoned mine shaft within its territorial limits, a plan proposed near the San

[5] Committee Hearings, February 25, 1958.

[6] For additional discussion of federal-state relations and responsibilities in radiation protection and control see Frampton, George T., "Radiation Exposure—The Need for a National Policy," *Stanford Law Review*, Volume 10, Number 1, December, 1957, and David F. Cavers, "Legislative Readjustments in Federal and State Regulatory Powers Over Atomic Energy, *California Law Review*, March, 1958, Vol. 46, No. 1, School of Law, University of California, Berkeley, pp. 22-39.

[7] See Appendix I for copy of proposed amendment.

[8] The Joint Federal-State Action Committee, Report to the President of the United States and to the Chairman of the Governors' Conference, Progress Report No. 1, U. S. Government Printing Office, Washington, D. C., December, 1957, pp. 9-10.

> Francisco Bay area. Yet under the Atomic Energy Act of 1954 serious questions of state jurisdiction are presented. By that act the AEC was authorized to impose health and safety standards on licensees, and such regulations have been issued. Nowhere in the act is there any indication of the role of the states. This, of course, has raised many questions: Is there any constitutional basis for this exercise of federal power? Has the Federal Government 'occupied the field'? Or part of the field, and, if so, what part? Or have the states concurrent jurisdiction to regulate?'' [9]

Even though the question of *State* v. *Federal Authority* remains unanswered for the present, the AEC has told this committee that "a great deal can and should be done by the State now." Mr. Robert Lowenstein, Office of the Legal Council, AEC, added that the AEC would favor state legislation which would "direct the attention of state officials to the problems of the atomic energy age, which would establish a co-ordinator who could serve as a point of contact for the AEC, and which would establish machinery to help achieve consistency between federal and state programs for the control of radiation hazards." [10]

Further, it is important to emphasize again the importance of those sources of radiation which the Atomic Energy Act does not purport to cover. It has been estimated that "these sources account for a much greater percentage of the total exposure to ionizing radiation in the country than AEC licensed sources—perhaps greater than 20 to 1." [11] These sources of radiation, presenting a potential hazard to the public health which is purely local in nature, are a clear responsibility of the state or local government.

The U. S. Public Health Service

The major function of the U. S. Public Health Service, U. S. Department of Health, Education and Welfare is to: (1) provide research, financial and technical assistance to the states; (2) conduct and encourage the conduct by others of research into the causes, diagnosis, treatment, control and prevention of diseases; (3) advise states in matters relating to the preservation and improvement of public health.

Its function is to "back up" the states in their public health programs—not to assume direct operating responsibility for such programs.

The Division of Radiological Health, formed in 1956, began operation on July 1, 1958, to provide technical consultation, information, and other special services to assist states in developing legislation and regulations in radiological health. A research branch is giving primary consideration to long-term epidemiological studies and particularly to low-level radiation exposure. A training branch administers and develops a national training program to help meet the need for health personnel.

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[9] Albert W. Harris, Jr., "State Regulation of Hazards Growing Out of the Use of Atomic Energy," *California Law Review*, March, 1958, Vol. 46, No. 1, School of Law, University of California, Berkeley, pp. 85-6.

[10] Committee Hearings, February 25, 1958.

[11] Harold L. Price, "The AEC Program for Licensing and Regulation," Proceedings of a Conference, sponsored by the Nuclear Energy and Employee Health and Benefits Committees of the National Association of Manufacturers and by the National Industrial Council, May 21-23, 1958, New York, 1958, p. 18.

The National Institutes of Health have made substantial grants to universities, colleges and scientific institutions for research in radiobiology. The University of California, Stanford University and other institutions in the State are sharing in these funds.

Training programs, consisting of one to two-week courses in radiological health, in the monitoring of water, air and food, in reactor hazards, and in occupational hazards are offered to state and local public health personnel at the Robert A. Taft Sanitary Engineering Center in Cincinnati, Ohio, and occasionally at universities in other parts of the country. In July and August, 1958, for example, the service conducted three two-week courses at the University of California campus in Berkeley for personnel from the 11 western states, Alaska and Hawaii.

The Public Health Service provides technical consultation on special problems to the states. However, the Public Health Service informed the State Department of Public Health on May 7, 1958, that it did not have any specialist in California, or close to California, who could spend full time assisting the department develop a radiological health program, nor did it have a technical consultant who could be assigned to the department for assistance in laboratory work, surveillance, etc. It maintains no laboratory in California or at any point close to California.

In co-operation with state agencies, the service is operating air surveillance stations in various parts of the U. S. to measure air pollutants. There are two stations in California operated in co-operation with the State Department of Public Health which check radioactive air pollutants. This represents sampling only and does not in any sense of the word provide the detailed information needed for evaluating radiation activity throughout the State, nor could any intelligent state action result from these data alone.

A study, started in April, 1957, to analyze radioactivity in milk, involves the testing of samples from five areas in the country—the milksheds serving Salt Lake City, St. Louis, Cincinnati and New York City and Sacramento. A monthly one-gallon sample, composed of a day's delivery by a group of dairy farms, is collected from each area for testing. Although the service plans to establish additional sampling points, no more are at present planned for California.[12]

The U. S. Public Health Service feels that the principle responsibility for radiation health protection, as with public health protection in general, rests with state and local health agencies. Dr. Leroy E. Burney, U. S. Surgeon General, has said, "the increasing medical and industrial uses of fissionable materials place this responsibility in the realm of community health protection, since these major sources of exposure are the common experiences of life and work, rather than the extraordinary occasional experiences relating to military operations."

Other Federal Agencies

The many military applications of nuclear energy and the extensive activity of the Defense Department in the radiation and atomic energy

[12] A report on a recent study conducted by Consumers Union on the effects of fallout on milk may be found in *Consumer Reports*, Volume 24, Number 3, March, 1959.

field within California are well known. At the present time, there is no administrative structure to insure co-ordination or communication between the Defense Department and the other agencies active in California.

Many other federal agencies are concerned to some degree in atomic energy activities and radiation protection. Included among them are the following:

1. The Civil Aeronautics Administration, Department of Commerce, which issues safety standards and civil air regulations relating to the transportation of explosives and other dangerous materials (Code of Federal Regulations, Title 14).

2. The Food and Drug Administration has asked for legislative amendments to the Food, Drug and Cosmetics Act to give it authority to act in protection of public health and safety with relation to the use of radiation in the processing of food and drugs.

3. The U. S. Weather Bureau gathers data for understanding the dynamics of natural and man-made radiation in the atmosphere. It is co-operating with federal and local health departments in their efforts to monitor and minimize radiation exposure.

4. The Post Office Department regulates the amounts and packaging of radioactive materials which may be sent by mail.

5. The Interstate Commerce Commission classifies radioactive materials as "Class D Poison" and regulates their transportation by common carriers engaged in interstate commerce. (Part 71-78 of Title 49, Code of Federal Regulations.)

6. The U. S. Coast Guard regulates the transportation of radioactive materials within its jurisdiction. (Title 46, Code of Federal Regulations.)

Other federal agencies whose activities affect in one way or another the use of radioactive materials in California should be mentioned. These include the Department of Agriculture, the Children's Bureau of the Social Security Administration which is interested in radiation effects upon the health of children, the Office of Education, the Department of Labor (the Bureau of Employees' Compensation and the Bureau of Labor Standards which works with state labor departments to promote industrial health and safety).[13]

THE STATE OF CALIFORNIA

Department of Public Health

The Department of Public Health has received no specific legislative directive to conduct a comprehensive radiological health program. However, the problem of radiation protection is clearly a public health concern. The department has general responsibility and broad authority under the provisions of the Health and Safety Code to protect the public health and safety. It also has the authority to investigate any conditions or circumstances which might affect the public health.

The department was authorized by the 1955 Legislature to prohibit any person from disposing of radioactive wastes when it determined

[13] Additional information on the federal agency responsibilities and activities in the field of radiation protection and control may be found in the Report of the Assembly Interim Committee on Public Health, Volume 9, Number 15, Chapter 4.

that such disposal would endanger the lives or health of human beings.[1] Although the department has analyzed some samples of sewage to determine radiological content in connection with this responsibility, the department feels the present statute is not broad enough to support a preventative program.

Beyond this, the department has undertaken a limited radiation program under the general provisions of the Health and Safety Code and in accordance with the State Board of Health statement of July 19, 1957, that, "It is the policy of the department * * * to assume its responsibility for the protection of the public against the hazards of radiation. * * * "

The activities discussed below indicate the nature of the existing program.

Environmental Monitoring

Environmental monitoring, although it has been extremely limited in scope, has been one of the departments major activities. Routine monitoring to determine radioactivity in the *air* is done at two stations in California—Berkeley and Los Angeles. Daily samples are taken at one location in each city. This program was initiated in 1956 by the U. S. Public Health Service in co-operation with the state department. The samples are collected and tested by the state department to determine the amount of radioactivity and then are forwarded to the U. S. Public Health Service Laboratories for a more accurate analysis. However, it is approximately six weeks before the department receives an analysis report from the Public Health Service.

Samples of *rainfall* are collected at the Los Angeles and Berkeley stations and in San Diego, San Bernardino, Santa Barbara, Fresno, Sacramento, Santa Rosa, and Redding. These samples are all analyzed in the department's Berkeley laboratory. Rainfall collected at Berkeley and Los Angeles is also forwarded to the U. S. Public Health Service Laboratories for its analysis. The program at Berkeley was made routine by the state department in February, 1958; the rest of the state in late fall of 1958.

Since March, 1958, the department has analyzed *snow* runoff samples at Soda Springs and snow samples from nine points on major snow courses. These samples are collected by a number of state, federal, local and private agencies.

Biyearly checks of *surface water in streams and rivers* is obtained through a co-operative program involving the Public Health Department, the Department of Fish and Game, the Department of Water Resources and the Water Pollution Control Boards. Samples from 75 stations in the State are analyzed to determine their bacteriological, chemical, biological and radiological content. Following the March, 1958, fallout incident, the department tested the water in a number of reservoirs throughout the State. At the present time, checks are occasionally made for radiation in domestic water supplies and sewage. The Public Health Department also analyzes occasional samples at the request of local health departments and water districts.

During periods of bomb testing and fallout, the department obtains information on radioactivity from a number of sources in the State in-

[1] Health and Safety Code, Secs. 25600-604.

cluding the University of California, California Disaster Office, the Los Angeles City and County Health Departments, the U. S. Navy, and private companies engaged in measurement of radiation, in order to help it interpret the extent and significance of fallout.

In February, 1958, the department's monitoring program was described by Dr. Robert Dyar, State Department of Public Health this way:

> "Our activities in relation to surveillance consist of occasional special surveys when problems are brought to our attention by the public and by local health agencies, monitoring of air, water and sewage for limited intervals when potential hazards are known to be possible, continuous air monitoring in Berkeley and Los Angeles, consultation on request with a limited number of prospective users of radioactive materials * * * medical investigations on request of the Atomic Energy Commission of possible injury or hazards from fallout during the spring weapons testing. There is no routine observation of major water sheds, of principal waste disposal systems, no organized departmental system of registration of users of radioactive materials, * * * no control of the use of tracer studies beyond that of the Atomic Energy Commission of the primary user.[2]

Since that time the additional monitoring activities described above have been undertaken by the department. Still, the present program is a minimal one and does not provide enough data for an adequate evaluation of the exposure of the people of California.

The department has been attempting to augment its existing monitoring program by establishment of a voluntary program among state agencies for the pooling of radiation data. This program is in the planning stages now. If it is established, agencies wishing to co-operate will submit data to the department. The department will summarize and collate this data and distribute it on a quarterly basis to the participating agencies.

In addition a radiological health consultant, employed by the department in the spring of 1958, has been endeavoring to develop a co-ordinated program of radiological health protection. The program tentatively proposed by the department includes a detailed program for environmental monitoring which would involve interested state, federal and local agencies. The program would include the continuous monitoring of air, rain, snow, water supplies, waste disposal, food, and medical, industrial and commercial uses of radiation.[3]

Other Activities

The department reported to the committee that it has initiated meetings with other agencies to effect some of the needed interagency co-ordination. For example, departmental staff members along with other state and local agency representatives have met with reactor firms to discuss problems relating to reactor location, waste disposal, and the protection of personnel. They have met with waste disposal companies to resolve questions relating to the disposal of waste materials into the ocean.

[2] Committee Hearings, February 25, 1958.
[3] See Appendix VI for Department of Public Health proposed monitoring program.

A list of AEC licensees in California is maintained by the department and distributed to other state agencies, to local health departments, fire departments, police and other interested local agencies. The department also notifies local health jurisdictions of new licenses in that particular jurisdiction.

Plans for new hospital construction and modifications of existing structures are checked by the department to make certain that there is provision for the adequate shielding of personnel from radiation and X-ray equipment.

The department has initiated studies of the health hazards of radiation exposures to industrial workers and to the population at large. It is now studying the propriety of using radioactive tracers to study such things as ground water levels and stream flow. The department also has, on occasion, provided consultation to medical, dental and industrial users of radioactive materials.

Equipment and Personnel

The department's radiological equipment is not adequate for conducting anything more than a very limited program. Its field equipment consists of survey instruments suitable for gamma and X-ray measurement. Pocket dosimeters, capable of showing whether the wearer has been exposed to an excessive amount of radiation in a given day, are available for personnel protection. The department reported to the committee that additional equipment is necessary to measure other types of radioactivity—e.g., alpha and beta particles and neutrons, and to calibrate present field equipment.

The department's laboratory equipment is likewise limited. It has on loan from the California Disaster Office two so-called proportional counter converters and scalers. (It is questionable whether or not they are both in good working condition.) The department was authorized to purchase an automatic proportional counter during the 1958-59 Fiscal Year. These proportional counters are suitable for the separate measurement of alpha and alpha plus beta particles. According to the department, additional equipment is needed:

(a) to handle a greater sample volume (more proportional counters).
(b) to handle samples with a low-level of radioactivity.
(c) to measure gross or separated gamma activity.
(d) to perform isotopic analysis.

The department has the following personnel:

1. A radiological health consultant employed in the late spring of 1958 to advise the department on the type of radiological health program which should be adopted.

2. One associate sanitary engineer who spends full-time on the program for the disposal of radioactive wastes.

3. One junior chemist devoting a part of his time to the analysis of materials sent in by the above sanitary engineer using borrowed Disaster Office equipment. He has also done some contract work for the State Water Pollution Control Board.

4. Two persons are attending a one-year course in radiation protection given by the AEC. It is anticipated that they will, after the course is completed in mid-1959, train additional department personnel.

California Disaster Office, Division of Radiological Safety

The Division of Radiological Safety was established in 1950 within the Office of Civil Defense (now the California Disaster Office). Its function is to provide for the planning, development and maintenance of a radiological defense program and to effectuate and carry out such a program in the event of disaster or extreme emergency. The division, to carry out this function, acquires, distributes, controls, and maintains radiological monitoring equipment. It performs some laboratory analysis of assorted materials for radioactivity, principally on a contract basis for other agencies. It develops training materials and conducts courses designed to qualify instructors who will in turn train persons for volunteer monitoring work in case of emergency.

Facilities and Equipment

The division's main laboratory, which is maintained in the Sacramento headquarters office, is equipped to analyze and measure various types and quantities of radioactive materials.

The laboratory also has a "growth chamber" capable of measuring the uptake of radioactive materials grown in contaminated soil. Although it is maintained for use on a standby basis, it is not presently being used for any analysis.

Radiological defense equipment for use throughout the State which is owned and maintained by the division includes the following:

a. Sixteen mobile laboratories which are assigned to various agencies throughout the State. Their primary purpose is to provide emergency radioassay service; they are generally capable of analyzing and identifying types and amounts of radioactive material.

b. 105 radiological squad trailers which are also assigned to local jurisdictions. They are equipped with less sensitive portable radiation detection instruments (ion chambers and Geiger counters) and communication facilities. They are capable of conducting area surveys to determine the existence and distribution of radioactivity.

c. Some 4,400 state-procured portable radiation detection instruments or field survey instruments (geiger counters and ion chambers). Most of these have been assigned to hospitals, fire and law enforcement agencies, state highway maintenance stations; others are kept in reserve by the division or are used by the division for training purposes.

d. The Federal Government has provided the division with approximately 1,200 portable radiation detection kits for distribution to high schools, state and local agencies. These kits, containing survey instruments such as geiger counters, ion chambers and dosimeters, must be kept in a state of operational readiness and available for civil defense purposes.

Sampling, Testing and Monitoring

Sampling and testing of air, water, soil, and plant and animal products can be and are made through facilities of the Division of Radiological Safety. Tests may be conducted by the 16 mobile laboratories in the field, or by the fixed laboratory at the Sacramento headquarters.

In the headquarters laboratory, which is staffed with one chemist, much of the sampling and testing is done for other state agencies in order to maintain the laboratory facilities in a condition

of readiness. The stated basis for this laboratory's existence is that it be available "as a backup emergency facility for the mobile laboratories." In this connection, one of its major activities is that of servicing two contracts, one with the State Water Pollution Control Board and one with the State Department of Water Resources, under which water samples from several points in the State are tested for radioactivity. The laboratory also has, on occasion, tested water and sewage samples for the State Department of Public Health, regional water pollution control boards, and the Federal Bureau of Reclamation.

The mobile laboratories exist to provide emergency radio-assay services to radiological defense evaluation boards in time of disaster. They are used during nonemergency periods to keep equipment operative and personnel proficient. Results of tests made in mobile laboratories are not normally reported to the division at Sacramento headquarters unless they indicate unusual levels of environmental radioactivity.

A portion of the division's radiological monitoring is done by specially trained volunteers, who will perform survey monitoring, personnel and equipment monitoring and radiological laboratory assay as required when a state of emergency exits.

The State Disaster Office has in effect plans or projected plans by which periodic reports are made, or will be made to it, by other state or local agencies. For example, California's Division of Highways currently has 63 separate maintenance stations which are equipped with monitoring instruments and are prepared to make reports upon the request of the Disaster Office or when an unusually high level of radioactivity is detected. A similar program is being developed within the California Highway Patrol, the Division of Forestry, the Division of Industrial Safety, and the Department of Fish and Game. It is anticipated that this program will be in operation by the end of the current fiscal year. Generally speaking, the instruments and other equipment distributed by the division to these local agencies will be used for their own protection, e.g., to discover radioactive materials upon persons admitted to a hospital as a means of protecting the hospital, the staff, and patients.

Training Program.

The principal purpose of the division's training program is to instruct selected individuals to conduct courses in local communities for the training of volunteer monitoring specialists, squad and group leaders and radiological meter operators. The division offers: (1) a radiological meter operator course; (2) a radiological defense (RADEF) field operations course; (3) a course in the control and evaluation of radiological hazards; and (4) a mobile laboratory technicians course. Approximately 14,000 persons had been trained under this program as of December, 1958.

The committee believes it is important to re-emphasize that the primary function of the division is to provide for a radiological safety program in the event of a disaster. Its function is not to perform continuous surveillance to determine the amount of radiation in the environment. While the 16 mobile laboratories are being used by local agencies, these agencies do not transmit data on the level of radioac-

tivity on any routine basis to the state headquarters. The central laboratory, presently doing some laboratory work on a contract basis for local governmental agencies, is not adequately staffed to perform radiation analysis for all state agencies which may require such analysis. The division staff has only one chemist engaged in laboratory work. There is some question as to whether or not its equipment is adequate to perform many of the complicated types of radiation analysis which apparently are, or will be, needed by various agencies within the State.

The present program of securing, distributing and maintaining the gross disaster type of equipment is a proper and very necessary function under the present concept of the purpose of the Disaster Office.

Department of Industrial Relations, Division of Industrial Safety

The Division of Industrial Safety of the State Department of Industrial Relations enforces and administers all laws and safety orders relating to life and safety of workers in places of employment.

This is the only agency which, under its general power and authority, has adopted specific and detailed regulations designed to control possible radiation hazards, or which has established specific radiation exposure regulations.[5] These regulations, first adopted in 1950, established minimum standards for the protection of employees exposed to potentially injurious levels of ionizing radiation or potentially injurious quantities of radioactive materials (excluding such ionizing radiation or radioactive materials as cosmic radiation or normal radon or thoron in the atmosphere). They specify maximum permissible exposures to radiation. They require the periodic inspection and monitoring of areas where ionizing radiation is used, an annual inspection of equipment, machines, and installations producing ionizing radiation, and that employees subjected to ionizing radiation wear monitoring devices. They specify how radioactive materials must be handled and stored, and specify many other details incident to the use of radioactive materials.

The division administers the safety orders by survey, inspection, investigation and followup to make certain that hazards are eliminated. The division reported to the committee that, during the last year, it has been necessary to write some 60 directives requiring employers in about 18 places of employment to make changes affecting radiation hazards.

The division provides technical consultation to employers utilizing atomic energy or radiation and reports that in most instances it is able to achieve compliance with the industrial safety orders without issuing notices or writing formal requirements.

The AEC is responsible for enforcing its safety regulations by those firms operating under AEC licenses. At the same time the Division of Industrial Safety must inspect to insure the safety of employees in all phases of employment; this includes the possibility of unnecessary exposure to radiation. Although the division and the AEC report a close co-operation in the regulating activity, there does appear to be confusion as to where the primary responsibility lies. There are many more sources of radiation in existence which are not subject to AEC licensing and control which are clearly subject to the division's safety orders.

[5] Title 8, Group 6, Article 53, California Administrative Code. Regulations are based on NCRP Standards.

Equipment

The Division of Industrial Safety has no radiation detection equipment to speak of. There are a few dosimeters used in some instances. These are pencil-like pieces of equipment that a person places in his pocket and examines periodically to determine if he has been exposed to an excessive dose of radiation for that day.

When equipment is needed for the measurement of X-rays to insure the proper amount of shielding is provided, the division uses the service of the Bureau of Adult Health, Department of Public Health, which provides the equipment and an engineer. The Bureau of Adult Health has a continuing working relationship with the Division of Industrial Safety and generally provides the medical analysis for the division when it is needed.

Personnel

The division has no people who are specifically trained in the field of radiation protection. However, the top supervisory personnel of the division have attended extension courses at the University of California to learn the theory of radiation protection. The middle supervision level have attended one- to two-week courses and seminars conducted by the Public Health Service and the Atomic Energy Commission.

Gradually the division's safety engineers have been learning the techniques and methods of inspection. It is a slow process, however, and at present only six or eight staff engineers are qualified to do the necessary inspection.

Two of the division's 16 district engineers are attending a one-year educational and training program in radiation protection in the East conducted by the Atomic Energy Commission. It is anticipated that when the course is completed in June, 1959, these two persons will then train additional division personnel.

The division feels that the existing statutes are broad enough to permit it to take whatever action is necessary to control radiation hazards. There is, however, a clear need to clarify the relationships, between this division, the AEC, and other state and local government agencies.

It is necessary to insure that the division's regulations continue to reflect the most current knowledge of radiation hazards and that its regulations be co-ordinated with those which may be developed by other agencies.

Department of Water Resources

The department as a part of its overall planning function is studying the possible applications of nuclear energy for the development of the State's water resources, for the generation of electricity, and for the conversion of saline and brackish waters. Associated with these planning activities and included in the department's program is the consideration and investigation of present and potential water pollution problems involved in a continually expanding utilization of radioactive materials for industrial purposes.

The Department of Water Resources has broad and continuing responsibilities for investigation of water quality conditions throughout

the State. The department's authority is derived from the Water Code, Section 229, which directs that:

> The Department * * * shall investigate conditions of the quality of all waters, coastal and inland, as related to all sources of pollution of whatever nature and shall report thereon to the Legislature and to the appropriate regional water pollution control board annually, and may recommend any steps which might be taken to improve and protect the quality of such waters.

A number of continuing state-wide water quality monitoring projects and numerous special investigations which are conducted by the department to implement this directive are described below:

Monitoring of Surface Waters

Surface waters have been monitored by the department since 1951 as a part of periodic stream sampling program initiated at the suggestion of the State Water Pollution Control Board. Samples, collected monthly from about 150 stations located on ninety major streams and lakes, are analyzed for mineral and bacterial content. An analysis of the radioactivity of these samples is made semi-annually by the Radiological Services Unit of the California Disaster Office. The costs of these analyses are borne by the State Water Pollution Control Board.

Monitoring of Ground Waters

The department also conducts a program for the monitoring of ground waters throughout the State. This program covers 50 areas of ground water development and involves approximately 900 wells. Particular attention is paid to problem areas where ground water basins are subject to degradation by such factors as sea water intrusion, adverse salt balance conditions, interconnection of aquifers through faulty wells, or disposal of oil field grinds or other wastes. Determinations of radioactivity have only recently been incorporated in this program to evaluate the effects of the disposal of radioactive wastes either deliberately or accidentally on ground waters.

In view of possible future effect of improper disposal of radioactive waste on ground water supply, the department has this year started monitoring radioactivity in Southern California, and will extend this program on a state-wide basis during the fiscal year 1958-59. During this fiscal year, some 200 samples of water will be tested to determine the existing levels of radioactivity. It is contemplated that particular attention will be paid to areas such as Simi Valley in Southern California, and Livermore Valley in Alameda County, where considerable research and development in the use of fissionable materials is being conducted. At the request of the Regional Water Pollution Control Board No. 2, the Department is conducting a monitoring program in the San Francisco Bay area to observe whether operation of the experimental nuclear reactor and power plant near Pleasanton affects waters in the Alameda Creek watershed.

Laboratory Facilities

The department itself has no laboratory facilities to perform the necessary radiological analyses. The California Disaster Office does this

work for the department on a contract basis. The samples which are collected by the department either in connection with its own state-wide monitoring program or for a specific water pollution control board are forwarded on to the Disaster Office for analysis.

In summary, the Department of Water Resources is now checking the levels of radioactivity at 150 stations located on 90 major streams and lakes twice annually. It is checking levels of radioactivity in the ground water of approximately 50 areas in the State. Lastly, it is conducting an analysis of the levels of radioactivity in the waters of San Francisco Bay.

It should be noted that the department's responsibilities are primarily investigative and do not encompass regulatory or enforcement functions per se. This power, rather, is vested with the several water pollution control boards.

Water Pollution Control Board

Under the Water Pollution Control Act (Division 7 of the Water Code), the State and Regional Water Pollution Control Boards have the responsibility and authority to control water pollution by prescribing and enforcing requirements for *all* discharges of sewage and industrial waste. Pollution is defined as an impairment of the quality of the waters which would adversely affect the use of such waters for domestic, industrial, agricultural, navigational, recreational, or any other beneficial use. (Health hazards created by such pollution would be under the control of the state and local health departments.)

The definitions of sewage and industrial waste given in Section 13005 of the Water Code are sufficiently broad that wastes resulting from the use or processing of radioactive materials would come under the jurisdiction of the agency. Although the boards do not control wastes that are discharged directly into a community sewer system, they do prescribe requirements for the wastes that are ultimately discharged from a community system into the waters of the State.

Under the provisions of Section 13054 of the Water Code, any person or agency proposing to discharge sewage or industrial waste that contains radioactive material must file a report of the proposed discharge with the appropriate regional water pollution control board. The board must then prescribe requirements as to nature of the proposed discharge. It is important to note here that the water pollution control boards have no authority outside the three-mile territorial limit—all ocean disposal of radioactive waste to date has been outside the limit.

The monitoring program conducted by the board and the Department of Water Resources was discussed in the previous section. Background radiological data on ocean waters is being obtained in Southern California coastal waters under the state board's research contract with the Allan Hancock Foundation for an oceanographic survey of those waters.

There is no duplication of work between the Department of Water Resources and the water pollution control boards due primarily to the fact that much of the work undertaken by the department is under contract to the boards. In other words, the department acts as a technical advisor both under specific contract and in connection with its own monitoring program. However, other state agencies such as the Department of Public Health and the Department of Fish and Game

are concerned with the problems of water pollution. In the Federal Government, the AEC is responsible for licensing firms which dispose of radioactive wastes. Such interagency responsibilities as these emphasize the importance of co-ordination to insure that no duplication of work is done by these various agencies, and more important, to insure that no areas of importance to the public health are overlooked by these agencies because of the interjurisdictional problems.

Department of Fish and Game

The Fish and Game Commission and Department of Fish and Game are charged in general with the protection and preservation of the fish and wildlife resources of the State.

The department is specifically charged with enforcement of Section 5650 relating to water pollution prohibition. "It is unlawful to deposit in, permit to pass into, or place where it can pass into, the water of this State * * * (f) any substance or material deleterious to fish, plant life, or bird life." This has been interpreted by the department to include radioactive materials or wastes. (There is no like specific section covering responsibility of the department as it would apply to other game and wildlife on land.)

However, since the department has no authority to regulate or permit any specific acts relating to the use or disposal of radioactive material, it has not carried out any specific control or regulation in this field.

The department has no equipment, other than some Geiger counters on loan from the California Disaster Office with which to monitor radioactivity. Nor does it have any personnel devoting full time to this problem at the present time.

It has, however, attempted to amass information concerning the technical and biological effects of radioactive materials on fish and game populations. At the department's request and in co-operation with the department, the U. S. Navy has set up a radiological environmental monitoring program at the Navy's Mare Island Station. This program has been established in anticipation of potential radioactive buildup associated with the development, construction and servicing of nuclear propelled submarines.

Further, the department has been active in keeping abreast of the developing situation and in pointing out to the West Coast representatives of the Atomic Energy Commission, and to other agencies, the responsibilities and possible effect of actions taken under AEC regulations on fish and game.

Department of Agricultiure

The Department of Agriculture which has general authority to insure that food products are free from contamination or adulteration by any substance injurious to the public health, believes that this authority would extend to radioactive substances. However, the department has undertaken no formal radiation program. Departmental staff members have attended courses of instruction dealing with radiological problems and the control of radiation in food products. For instance, the Assistant Chief of the Bureau of Meat Inspection attended a two-week course given at Oak Ridge, Tennessee, in March, 1958.

The department, following the March, 1958, radioactive rainfall incident secured samples of leafy vegetables upon the request of the State Department of Public Health through its regular market sampling procedure. The department itself did no testing since it has no equipment for this purpose.

The department feels that there should be facilities for the routine checking of food for radiation, but has indicated to the committee that there was no justification at this time for the establishment of expensive radiological assay facilities in the department because of the limited use to which they might be put. Rather it feels that, for the present, necessary assay work should be done by some other state agency with the necessary facilities.

California Public Utilities Commission

There are at present no statutes under which the commission acts which refer specifically to the control of radiation hazards. However, it does have general responsibilities and authority in the field of safety which are derived from the broad regulatory authority it exercises over privately owned public utilities.[6]

The commission would be responsible for the protection of the public, the utility customers and employees from hazards presented by the operation of a reactor, if such reactor were a privately owned utility. It would also have jurisdiction over the transportation of radiological materials by common carriers.[7] Although there are some 850,000 trucks in California, the commission has operating authority over only 148,000 vehicles. Only 38,000 of these come under its safety regulations. The protection of the public due to a vehicle accident involving the transportation of radioactive materials on other than a common carrier would, at the present time, be uncertain.

Other State Agencies

Other agencies, although they are not now engaged in radiation protection activities, do have an interest in the problem. For example, the Department of Insurance has an increasing concern with the effect that radiation will have on workmen's compensation insurance rates.

The Department of Public Works' concern is with the protection of state highways and bridges which could be endangered by accidents involving the transportation of radioactive materials, and with the design of state buildings which may use or store radioactive materials. The California Highway Patrol would be affected by highway accidents involving vehicles carrying radioactive materials. Such agencies as the State Fire Marshal, port authorities and harbor commissioners, the Department of Professional and Vocational Standards and its various boards are or will also be concerned in varying degrees as the uses of radiation and atomic energy become more widespread.

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[6] "Public utility" as defined in the Public Utilities Code, includes every common carrier, toll bridge, pipeline, gas, electrical, telephone, telegraph, and water corporation, wharfinger, warehouseman and heat corporation, performing a service or delivering a commodity to the public.

[7] By Part 9 of General Order No. 99, the commission has adopted the regulations of the Interstate Commerce Commission for the transportation of explosives and other dangerous articles, including radioactive materials. The regulations relate to packaging, shielding and labeling of radioactive materials.

Governor's Advisory Committee on Peacetime Uses of Radiological Materials

This committee, composed of directors of the various departments in California which are concerned with radiation protection and control, was appointed by the Governor in the spring of 1956, to advise him on radiological matters. The committee, at its first meeting in July, 1956, appointed a staff committee which was charged with the responsibility of studying the problems and proposing solutions.

The staff committee has met on several occasions to determine ways in which the various state and federal agencies could co-ordinate their activities. In addition it worked with the Senate Committee on Governmental Administration during the 1955-57 interim and has been of assistance to this committee in its study.

In December, 1958, the committee submitted a final report to the Governor containing recommendations as to needed state legislation.[8]

RADIATION PROTECTION AT THE UNIVERSITY OF CALIFORNIA

Radiation protection activities in the University of California must be considered in two parts. The Radiation Laboratory, with branches at Berkeley and Livermore, is a large scale nuclear science research facility operated under contract with the Atomic Energy Commission. Approximately 125 technically trained persons work at the Radiation Laboratory solely on problems of radiation safety and protection. The policies under which they operate are essentially those established by the AEC.

Outside the Radiation Laboratory, and under a general license from the Atomic Energy Commission, some 1,500 persons on seven campuses and several field stations of the university work with ionizing radiation. This includes X-rays and radium for diagnosis and therapy in two medical schools and a veterinary school; and a multitude of radioactive isotopes for research in every branch of experimental science, in teaching, and in medical research, diagnosis and therapy. This work is subject to the policies, regulations and standards established in connection with the university's own program for radiation protections.

As presently organized, the university's radiation safety program consists of:

(1) A university-wide "Advisory Committee on Radiological Safety," advisory to the president, which is charged with the "formulation of basic policies for uniform practice throughout the university system wherever radioactive materials are involved." These policies, standards and procedures are detailed in a published "Manual for Radiation Safety."

(2) Regional advisory committees—for the northern and southern campuses of the university—"to carry out periodic reviews of the use of radioactive materials in any way whatsoever on the campus under their jurisdiction, to consider the effectiveness of the measures extant and modifications in procedure that seem to be indicated."

(3) A university-wide "Division of Radiation Safety," responsible for administration of radiation safety standards and policies.

[8] The report of the committee may be seen in Appendix IV.

Among the functions performed by the Division of Radiation Safety in carrying out its responsibilities are the monitoring of personnel, work areas, and radioactive waste disposal areas; the approval for safety of all proposed uses of radioisotopes; the review of building plans and specifications; the maintenance of lists of all users of radioactivity; and the provision of storage facilities for radioactive materials. The division also provides for disposal of radioactive wastes, maintains limited laboratory facilities for special or short-term use by qualified research workers, conducts a health examination program, and offers technical advice and assistance on the safe handling, use and storage of radioactive materials.

In general it may be said that the program administered by the Division of Radiation Safety is designed to provide effective surveillance over all work with radiation, from the initial planning and procurement to the disposal of radioactive wastes.

At the request of the Assembly Committee, the University-wide Committee on Radiological Safety submitted a report containing recommendations for a statewide radiation safety program.[9]

LOCAL GOVERNMENT AGENCIES

In addition to the activity of the state agencies, a number of cities and counties and other local government units are beginning to consider the enactment of radiation safety regulations. Already the City of Los Angeles has adopted an ordinance relating to the procedures for handling, storage, use, and transportation of radioactive materials. The city contemplates the enactment of another ordinance this next year requiring the registration of sources of ionizing radiation.

The Los Angeles Air Pollution Control District has been active in locating present and possible future sources of radiation, studying the factors which would affect the dispersal of radioactive material in Los Angeles County and monitoring the air for radioactivity. The district has been declared the Radiological Defense and Disaster Service for Los Angeles County by the board of supervisors. To meet that responsibility it has sponsored a radiological monitors training course, devised plans for the county in event of war-caused or peacetime radiological disaster, and has procured and distributed radiation detection and measurement instruments.

It is obvious that the concern of local governmental agencies over the problems of radiation protection and control will increase rapidly. "Mayors and county supervisors, city councils, planning agencies, zoning agencies, building code enforcement agencies, fire departments and police departments may all have occasion to understand the dangers of radioactive materials and the methods of coping with them. Local governments need to be informed and consulted in the best interests of their citizens in the direction and control of this new force which recognizes no political boundaries. And what is even more evident there is need for planned co-operation between levels of government." [10]

[9] See Appendix III.

[10] Report of the Assembly Interim Committee on Public Health, Volume 9, No. 15, Chapter 4.

VOLUNTARY CONTROL ACTIVITIES

The various branches of the healing arts and medical profession today account for one of the largest number of users of X-rays and radioactive materials in California. Dr. David E. Price, U. S. Public Health Service, has said in this regard, "One of the major sources of radiation today is the X-ray. If we can reduce needless exposure to X-ray without reducing its manifold benefits in the detection and treatment of disease, we have taken a significant step toward reducing the dimensions of the radiation exposure hazard. * * * One opportunity to reduce unnecessary exposure to X-ray lies in the reduction of the radiation doses delivered in medical and dental examinations. It is an unfortunate fact that many of the more than 160,000 X-ray machines being used in the healing arts today deliver a higher dose of radiation than is necessary. There is room for much improvement both in the machines themselves and in the techniques of their use."[11]

In response to this need various professional societies have been providing their members with information on the need to and methods of reducing exposure. For example, the American College of Radiology and the American Dental Association have prepared a handbook entitled, "A Practical Manual on the Medical and Dental Use of X-rays with Control of Radiation Hazards," which is being distributed to doctors and dentists and others throughout the Country. The dental and medical journals frequently carry articles relating to the hazards and use of radiation in the healing arts. Medical and dental schools require a course in the technique and practical application of X-rays. Radiologists regularly have their X-ray and fluoroscopic machines checked to insure that they are properly calibrated and operating at top efficiency.

Members of the medical profession who have had more experience in terms of time than any other single group are well aware of the problems. Representatives testifying at the committee hearings emphasized the importance of training and education of all members of the professional groups as to the means available for reducing exposure. Through such education and "self policing" by the doctors and dentists and the various healing arts licensing boards the witnesses felt that the X-ray hazard can be best reduced.

The major atomic energy firms in the state operate under AEC regulation. These and other industrial users of radioactive materials have been guided, in addition, by the recommendations as to safety and control measures made by a number of nongovernmental agencies. Included among these are the Atomic Industrial Forum, the National Industrial Conference Board, the American Public Health Association, the International Association of Industrial Accident Boards and Commissions, The American Standards Association, and various professional groups. A discussion of their activities in the nuclear energy field may be found in the companion committee report. Mr. Robert C. Thorburn, Health Physicist for General Electric Company, reported to the committee that, because of voluntary compliance by industry with these regulations and recommendations, industry has maintained an excellent safety record.

[11] David E. Price, M.D., "Radiation as a Public Health Problem," *Public Health Reports*, Vol. 73, No. 3, March, 1958, p. 197.

"The outstanding safety record of users and producers gives clear evidence that potential health problems posed by the industrial use of radiation can be controlled. This record has been made through voluntary compliance by industry with control procedures recommended by the National Committee on Radiation Protection. This committee and other recognized agencies such as the American Standards Association remain active in developing standards of performance for industry. * * * There are additional forces that assure the public against the careless use of radiation by industry. Careful compliance to the aforementioned recommendations is required of industry by insurance companies before issuance of policies. The licensing program of the U. S. Atomic Energy Commission now regulates the proper action for a large segment of all those using radiation. * * * These regulations, the economics of insurance and the principle of 'doing right voluntarily' have minimized the potential hazards to the health from radiation use." [12]

[12] Committee Hearing, June 9, 1958.

THE NEED FOR STATE ACTION

Preceding sections of the report have indicated the nature of the many and increasing applications of atomic energy and radiation which offer unprecedented opportunities for economic growth and developmen in the State. California has assumed a leading position in the atomic energy industry with a very minimal activity on the part of the State. The State should be prepared to promote and encourage the continuing development of this industry in California.

Particular emphasis has been given to radiological health and safety problems accompanying the growth of this industry which must be a primary concern and responsibility of governmental agencies.

Problem areas which have been mentioned only briefly are many and complex. The risks are not yet fully known. The problem of the disposal of radioactive wastes, for example, is one of increasing concern. Many methods of waste disposal are being studied, including disposal at sea, in inland lakes, and burial in the ground. Each of these has complicating factors which demand thorough investigation. For instance, how much of this disposed radioactive material buried at sea may be absorbed by various forms of marine life, eventually to impair a major food supply?

The transportation of radioactive materials may involve hazards to the public along the route. The Interstate Commerce Commission has promulgated rules and regulations for the interstate movements of radioactive materials. The California Public Utilities Commission has adopted the ICC regulations for common carriers coming under its jurisdiction. Intrastate contract carriers, however, are not required to comply with these regulations. The possibility of the increasing transportation of radioactive materials in nonregulated carriers is one of the problems in this area that demands state study to insure that adequate safeguards exist.

The persons most exposed to radioactivity will be the workers coming into contact with such materials in the course of their employment. Within the controlled environment, e.g., the industrial plant, the hospital and the laboratory, procedures for the safe handling and use of radioactive materials have been worked out, and in California the Division of Industrial Safety, is charged with the enforcement of safety orders relating specifically to radiation. However, accidents can happen.

> "Improper shielding of sources of radiation; rupture of containers in which radioactive substances are being used, shipped or stored, or careless handling—these are a few of the many ways radiation accidents can occur. Inattention to proper dose levels by those working with or near radiation may have more insidious results. A nuclear reactor's getting out of control may, under special conditions, cause widespread injury to people and loss of use of property because of radioactive contamination. These events should not occur if design and operating standards are properly

established and effectively enforced. Yet men make mistakes and accidents happen."[1]

Another related and as yet unsolved problem is that of workmen's compensation. Since the effects of radiation may not become apparent for months or even years after an employee is exposed to radiation, and further since damage may be caused by exposure to small amounts of radiation over a long period of time, it will be difficult to connect a particular injury or disease to occupational connected radiation exposure.

X-rays and radiation used by the doctor, the dentist, and other members of the healing arts comprise a principal source of radiation. Their uses are of incalculable benefit to the public in the diagnosis, treatment and cure of many diseases. In many cases, however, the radiation dose to which the patient is exposed is greater than is necessary to achieve the maximum benefit. The activities of the various professional associations directed towards controlling this hazard, were discussed previously. Whether or not inspection of some of these sources should be a state responsibility is a question that demands further study.

However, since we do not, at the present time, know the number of radiation sources within the State, nor where they are located, it is clear that registration of these sources is needed and is a proper responsibility of the State.

The possibility of a reactor explosion is probably the most dramatic public hazard. Dr. Bellamy reported that "although such an event is highly improbable, * * * should it happen * * * it could involve damages measured in the billions of dollars. Should it occur in a thickly settled or highly industrialized urban area, anywhere from a few tens to a few hundreds of square miles could be seriously involved with contamination. In this context, one will, I believe, want to look to the barn door before the horse is stolen; once radiation damage has occurred, * * * it is too late to do much about it."[2]

Radiological contamination of the environment affecting the public in general is of increasing concern. The episodes in late March and April of 1958 when the fallout increased the levels of environmental radiation in the San Francisco Bay area far above "normal" aroused widespread public concern. As dramatic as fallout is, many feel that there are other problems equally or even more dangerous. Environmental contamination resulting from the operation of reactors, the disposal of radioactive wastes, or the accidental release of radioactive materials is a vital public health problem that demands state action. We lack adequate knowledge of the amount and distribution of radiation now in the environment, of how it can be controlled, or of the amount of radiation which may be transmitted back to man through the air, the rivers and oceans, plant and animal life.

These are but a few of the problems facing Federal, State and local government agencies.

The responsibility for insuring safety in atomic energy activities was initially vested in the Atomic Energy Commission. However, since the passage of the 1954 Atomic Energy Act, there has been a rapid transi-

[1] The Panel on the Impact of the Peaceful Uses of Atomic Energy, Digest of the Report to Congress, Washington, 1956, p. 48.
[2] Committee Hearings, February 25, 1958.

tion from government monopoly to private operation under AEC regulation. Whether the State is precluded from acting in those areas in which the AEC retains regulatory jurisdiction is still in doubt. This committee feels that the question should be resolved at the earliest possible date by the congressional enactment of a clarifying amendment. If the 1954 act is a "transitional law for a transitional period," the State should be prepared to assume its responsibilities.[3]

Even before the question of state vs. federal authority is resolved, this committee feels that there is a vital need for state action. In the first place the State must enact legislation which will provide the administrative machinery to formalize and insure co-ordination between the AEC and the State. Further there is a clear need for the State to assume responsibility for those aspects of radiation which are not covered by the Atomic Energy Act.

The nature of the present activities and interests of the various state agencies clearly indicates the need for co-ordination within the State, to insure the programs of these agencies will add up to a sound total program without duplication. At the present time, there is clearly no definitive co-ordination among these various agencies.

The lack of knowledge of the number or location of radiation sources in the State clearly points up the need for a program of mandatory registration of sources.

The inadequacy of information of the amounts of radiation to which the public is exposed demonstrates the need for a statewide radiation monitoring program.

The many expressions of public concern about radiation exposure especially in the last year amply illustrate the need for the State to disseminate accurate information as to the amount of radiation to which the public is exposed and equally important, authorative interpretation of that information. The public should be told what it means when the newspapers report, as they have in the last year, "LA Records Heaviest 'A' Fallout," "U. S. Survey Shows Milk at 'safe' Radioactivity Level," "Rains Boost Radioactivity in Vegetables" or "You've Absorbed Only a Bit of Strontium 90, But."

Several different legislative approaches have been suggested as the means for meeting the present need for state legislation. Model state legislation or codes in the atomic energy field have been developed by the Council of State Governments, the National Committee on Radiation Protection, the American Public Health Association and others. The Governor's Advisory Committee on Radiological Safety consisting of representatives of presently concerned state agencies submitted proposed legislation in its report to the Governor dated December 11, 1958. The University of California's University-Wide Committee on Radiological Safety, at the request of this committee, submitted a report on radiation safety legislation on December 16, 1958.[4]

Representatives of the medical profession, industry, and the public testifying at the public hearings have generally agreed that legislation establishing a state policy regarding radiation would be desirable and

[3] The Panel on the Impact of the Peaceful Uses of Atomic Energy, Digest of the Report to Congress, Washington, 1956. p. 9.

[4] See Appendices II, III, and IV for copies of the model laws and recommended legislation.

they, too, have offered a variety of suggestions as to the type of legislation which would best meet California's need.[5]

This committee has reviewed and studied these various suggestions and recommendations, and in light of the needs in California believes that legislation to be enacted in California should be guided first by two principal policies.

First, it should insure that the people of California are not needlessly exposed to ionizing radiation, that safeguards are provided to protect the public from the possible misuse of hazardous radiation.

Second, it should insure the orderly and economic development of the atomic energy industry and the beneficial uses of radiation.

Beyond this the committee feels that legislation should:

1. Recognize our existing governmental structure and provide that each state and local agency retain its traditional jurisdiction wherever possible.
2. Provide that the initial organization be flexible so that it can be adapted to new conditions as they arise.
3. Provide for the co-ordination of all state agency activities relating to this field so that their separate programs will add up to a sound total program without duplication.
4. Provide for a single point of contact to facilitate co-ordination with the AEC and other federal agencies.
5. Encompass all types and sources of ionizing radiation since all ionizing radiation has similar effects. Therefore, it should provide for a system of registration of all sources of ionizing radiation.
6. Provide for an advisory committee composed of persons representing various groups and interests within the State to advise the Governor on atomic energy and radiation matters.
7. Provide for a program of continuous surveillance of the environment designed to detect, measure and record the levels of radiation to which the population is exposed.
8. Provide for a program of public information giving the public factual information and authoritative interpretation of data concerning radiation.

Continuing study by the State and its various agencies will be necessary to meet the challenges posed by this new and rapidly growing industry. This committee wishes to direct attention to the following specific problems that demand thorough study.

First, because radiation protection is extremely complex and will be required in fields of activity such as medicine, industry, agriculture, fish and game, research, transportation, and waste disposal, a means will have to be provided to supply state agencies with competent technical advice and consultation. Study is necessary to determine if this need should be met by the establishment in the State Government of a technical staff agency composed of experts in the various fields of radiation, and, if so, what its relationships with other agencies should be.

Related to this is the problem of laboratory facilities. There is no doubt that laboratory facilities are needed to support a radiation control program and that these facilities should be available to serve all state agencies. The present laboratory facilities of the California Dis-

[5] Recommendations of industry representatives testifying at the committee hearings are summarized in Appendix V.

aster Office and the State Department of Public Health are not adequately staffed or equipped for either the type of radiological analysis or conducting the program of environmental surveillance needed in the State.

It has been suggested that the State set up a large, completely equipped laboratory. The Department of Public Health now has a multimillion dollar investment in laboratories of all types including air sanitation, virus, industrial hygiene, sanitary engineering, food and drug, and bacteriological. Therefore, it has been suggested that, rather than establishing a completely new state laboratory, the needed equipment for radiological analyses be added to the department's existing equipment. In line with that it has been suggested that the Disaster Office Laboratory be incorporated by the Department of Public Health.

Another suggestion has been that the Disaster Office equipment be increased to the point where it could provide the needed services. Or again it has been suggested that the State contract with private laboratories for the performance of this function.

This problem is one which clearly needs immediate and thorough study and one which should be solved before state agencies attempt to meet their individual needs by equipping individual laboratories with costly equipment. During the interim, however, before a final solution is reached, this committee feels that the State Department of Public Health should be equipped with such equipment as is necessary to conduct its proposed environmental monitoring program.

The committee also feels that, for the present, the Disaster Office should retain its mobile laboratories which are necessary to determine whether an area is or is not safe in case of a gross disaster.

Thirdly, one of the most pressing problems is the increasing need for trained personnel. The State should assess the training programs that are now offered by, for example, the AEC and U. S. Public Health Service, the Division of Radiological Safety of the California Disaster Office, and by universities and colleges in the State to determine whether or not provision should be made for additional training programs.

This report has emphasized the need for a statewide surveillance program and believes that the program proposed by the Department of Public Health should be put into operation. It feels, however, that continuing study is called for to assess the State's needs in this area and to determine the adequacy of any program which may be initiated this next year for meeting that need.

APPENDIX I

ATOMIC ENERGY COMMISSION PROPOSED AMENDMENT TO THE ATOMIC ENERGY ACT OF 1954

SECTION 274. Co-operation with States. (a) The commission is authorized to co-operate with any state or group of states in carrying out the commission's responsibilities for protecting the health and safety of the public from radiation hazards incident to the processing and utilization of source, byproduct, and special nuclear material. To this end, the commission is authorized to enter into agreements with any state or group of states to perform inspections or to provide such other services to the commission as the commission deems necessary. Further, the commission is authorized to provide with or without charge training to employees of any state or group of states and such other services to any state or group of states as the commission deems necessary.

(b) Nothing in this act shall be deemed to prevent the states from adopting, inspecting against, and enforcing standards, not in conflict with those adopted by the commission, for protecting the health and safety of the public from radiation hazards incident to the processing and utilization of source, byproduct, and special nuclear material; provided, that this subsection shall not be deemed to authorize any state to exercise licensing responsibilities concerning those aspects of activities with regard to which the commission has licensing responsibilities; and provided further, that state radiation standards shall not apply to facilities operated by the government or facilities operated under contract with and for the account of the government. The commission is authorized to co-operate with the states in the development of such radiation standards.

(c) The commission shall continually study, in consultation with the states, the desirability of recommending to Congress legislation which would further adjust federal and state responsibilities in the radiation protection field.

APPENDIX II

A. THE COUNCIL OF STATE GOVERNMENTS SUGGESTED LEGISLATION

(SECTION 1. Declaration of Policy. (a) The State of [_____] endorses the action of the Congress of the United States in enacting the Atomic Energy Act of 1954 to institute a program to encourage the widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public; and therefore declares the policy of the state to be:

(1) To co-operate actively in the program thus instituted; and

(2) To the extent that the regulation of special nuclear, byproduct, and radioactive materials, of production facilities and utilization facilities and of other forms of radiation, and of persons operating such facilities may be within the jurisdiction of the state, to provide for the exercise of the state's regulatory authority so as to conform, as nearly as may be, to the Atomic Energy Act of 1954 and regulations issued thereunder, to the end that there may, in effect, be a single harmonious system of regulation within the state.

(b) The State of [_____] recognizes that the production or utilization of atomic energy and other forms of radiation may result in new conditions calling for changes in the laws of the state and in regulations issued thereunder with respect to health and safety; working conditions; workmen's compensation; transportation; public utilities; life, health, accident, fire, and casualty insurance; the conservation of natural resources, including wildlife, and the protection of streams, rivers, and airspace from pollution; and therefore declares the policy of the state to be:

(1) To adapt its laws and regulations to meet the new conditions in ways that will encourage the healthy development of industries producing or utilizing atomic energy while at the same time protecting the public interest; and

(2) To initiate continuing studies of the need for changes in the relevant laws and regulations of the state by the respective departments and agencies of the state which are responsible for their administration; and

(3) To assure the co-ordination of the studies thus undertaken, particularly with other atomic industrial development activities of the state and with the development and regulatory activities of other states and of the government of the United States.

SECTION 2. Definitions. As used in this act:

(a) "Atomic energy" means all forms of energy released in the course of nuclear fission or nuclear transformation.

(b) "Byproduct material" means any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material.

(c) "Production facility" means any equipment or device capable of the production of special nuclear material in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public; or any important component part especially designed for such equipment or device.

(d) "Special nuclear material" means plutonium, uranium 233, and uranium enriched in the isotope 233 or in the isotope 235, and any other material which the governor declares by order to be special nuclear material after the United States Atomic Energy Commission has determined the material to be such; or any material artificially enriched by any of the foregoing.

(e) "Utilization facility" means any equipment or device, except an atomic weapon, capable of making use of special nuclear material in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public, or peculiarly adapted for making use of atomic energy in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public; or any important component part especially designed for such equipment or device.

(f) "Radiation" means gamma rays and X-rays, alpha and beta particles, high-speed electrons, neutrons, protons, and other nuclear particles; but not sound or radiowaves, or visible, infrared, or ultraviolet light.

Section 3. United States Licenses or Permits Required. No person shall manufacture, construct, produce, transfer, acquire or possess any special nuclear material, byproduct material, production facility, or utilization facility, or act as an operator of a production or utilization facility wholly within this state unless he shall have first obtained a license or permit for the activity in which he proposes to engage from the United States Atomic Energy Commission if the Commission requires a license or permit to be obtained by persons proposing to engage in such activities.

Section 4. Conduct of Studies Concerning Changes in Laws and Regulations with a View to Atomic Industrial Development. Each of the following departments and agencies of the state is directed to initiate and to pursue continuing studies as to the need for changes in the laws and regulations administered by it that would arise from the presence within the state of special nuclear, byproduct, and radioactive materials, from the operation herein of production or utilization facilities, and from the generation of radiation, and, on the basis of such studies, to make such recommendations for the enactment of laws or amendments to law administered by it, and such proposals for amendments to the regulations issued by it, as may appear necessary and appropriate.

(a) (The Department of Public Health), particularly as to hazards to the public health and safety.

(b) (The Department of Labor), particularly as to hazardous working conditions.

(c) (The Workmen's Compensation Commission), particularly as to the time and character of proof of claims of injuries and the extent of the compensation allowable therefor.

(d) (The Department of Public Highways), particularly as to the transportation of special nuclear, byproduct, and radioactive materials on highways of the state.

(e) (The Public Utilities Commission), particularly as to the transportation of special nuclear, byproduct, and radioactive materials by common carriers not in interstate commerce and as to the participation by public utilities subject to its jurisdiction in projects looking to the development of production or utilization facilities for industrial or commercial use.

(f) (The Department of Insurance), particularly as to the insurance of persons and property from hazards to life and property resulting from atomic development.

(g) (The Department of Conservation), particularly as to the hazards to the natural resources of the state, including wildlife, and as to the protection of rivers, streams, and airspace from pollution.

(h) (The Department of Mines and Minerals), particularly as to the hazards involved in the mining of radioactive minerals.

(i) Such other departments and agencies (including departments and agencies of political subdivisions of the state), as the governor may direct and for the purposes specified by him, and such other departments and agencies as may be provided by law.

Section 5. Co-ordination of Studies and Development Activities. (a) The governor shall appoint a person to serve as adviser to the governor with respect to atomic industrial development within the state; as co-ordinator of the development and regulatory activities of the state relating to atomic energy and other forms of radiation, including co-operation with other states and with the Government of the United States. The person so appointed shall have the title of (Coordinator of Atomic Development Activities).

(b) The (Coordinator of Atomic Development Activities) shall have the duty of co-ordinating the studies, recommendations, and proposals of the several departments and agencies of the state (and its political subdivisions) required by Section 4 of this act with each other and also with the programs and activities of the (Department of Industrial Development). So far as may be practicable, he shall co-ordinate the studies conducted, and the recommendations and proposals made, in this state with like activities in other states and with the policies and regulations of the United States Atomic Energy Commission. In carrying out his duties, he shall proceed in close co-operation with the (Department of Industrial Development).

(c) The several departments and agencies of the state (and its political subdivisions) which are directed by Section 4 of this act to initiate and pursue continuing studies are further directed to keep the (Coordinator of Atomic Development Activities) fully and currently informed as to their activities relating to atomic energy and other forms of radiation.

(d) The (Coordinator of Atomic Development Activities) shall keep the governor and the several interested departments and agencies informed as to private and public activities affecting atomic industrial development and shall enlist their co-operation in taking action to further such development as is consistent with the health, safety and general welfare of this state.

(c) The (Coordinator of Atomic Development Activities) shall be paid a salary of ($) per annum.

SECTION 6. Atomic Energy Advisory (Board). (a) The governor is authorized and empowered to appoint from among the residents of this state a (board) of not to exceed (____) members, to be known as the Atomic Energy Advisory (Board). The members shall serve at the discretion of the governor. Among the members there shall be one member of the State Senate and one from the State House of Representatives, and those who represent the various activities affected by atomic energy and other forms of radiation. The (Coordinator of Atomic Development Activities) shall be a member and shall be ex officio the secretary of the (board).

(b) The (board) shall advise the governor and the (Coordinator of Atomic Development Activities) concerning the development, utilization and regulation of atomic energy and other forms of radiation. It shall review and evaluate the studies, policies and recommendations developed pursuant to this act, make recommendations to the governor and the (Coordinator), and furnish such technical advice as may be required on matters relating to atomic energy and the protection and welfare of persons from radiation hazards.

(c) The members of the (board) shall receive no salary for services performed on such (board) but may be reimbursed for necessary and actual expenses incurred in connection with attendance at meetings of the (board) or for authorized business of the (board).

SECTION 7. Injunction Proceedings. Whenever, in the opinion of the attorney general, any person is violating or is about to violate Section 3 of this act, the attorney general may apply to the appropriate court for an order enjoining the person from engaging or continuing to engage in the activity violative of this act and upon a showing that such person has engaged, or is about to engage in any such activity, a permanent or temporary injunction, restraining order, or other order may be granted.

SECTION 8. Co-operation. The heads of the appropriate agencies may co-operate with the Federal Government in the administration of this act or any matter pertaining thereto.

SECTION 9. (Insert effective date.)

SOURCE: The Council of State Governments, *Suggested State Legislation—Program for 1959.*

B. NATIONAL COMMITTEE ON RADIATION PROTECTION SUGGESTED STATE RADIATION PROTECTION ACT

"An Act for the Control of Radiations from Machines and Radioactive Materials, for the Purpose of Protecting Health."

Short Title. This act may be referred to as the (name of state) Radiation Hygiene Act.

SECTION 1. Statement of Policy. Whereas, radiation can be instrumental in the improvement of health, welfare, and productivity of the public if properly utilized, and may impair the health of the people and the industrial and agricultural potentials of the State if improperly utilized, it is hereby declared to be the public policy of this State to encourage the constructive uses of radiation and to control any associated harmful effects.

SECTION 2. Definitions. For the purposes of this act, the following words and phrases are defined:

(a) Radiation is gamma rays and X-rays, alpha and beta particles, high-speed electrons, neutrons, protons, and other nuclear particles; but not sound or radiowaves, or visible, infrared, or ultraviolet light.

(b) Radiation machine is any device that produces radiations when the associated control devices are operated.

(c) Radioactive material is any material, solid, liquid, or gas, that emits radiation spontaneously.

Additional definitions may be included.

SECTION 3. Creation and Organization of Agency: Advisory Board, Meetings, Employees.

(a) There is hereby created and established a State Radiation-Control Agency hereinafter referred to as the agency. The agency shall be an organizational component of the State Department of _____. (Alternate: There is hereby created and established an independent State Radiation-Control Agency, hereinafter referred to as the agency.)

(b) The Governor shall appoint a director of the agency (hereinafter called the director) who shall perform and carry out all functions and duties given to the agency under this act, and shall direct, carry out, and enforce all radiation safety control activities and measures vested in the agency. The director shall be a person having extensive training and experience in the field of health and of radiation protection.

(c) In accordance with the laws of the State, the agency may employ, compensate, and prescribe the powers and duties of such persons as may be necessary to carry out the provisions of this act. However, technical, legal and other services shall be performed, insofar as practicable, by personnel of existing state departments, agencies, and offices.

(d) The director may delegate to officers and employees of the agency such functions, duties, and authority as are vested in the agency by this act; except the authority to adopt and promulgate standards, rules, and regulations, and to issue or modify orders.

(e) There is hereby established within the agency a State Radiation Technical Advisory Board, hereinafter referred to as the "board," consisting of five members. The director of the agency shall be a member of the board. The other four members shall be persons with scientific training in one or more of the following fields: health, agriculture, medicine, radiology, radiation physics, biology, industry, labor, atomic energy. The Governor shall appoint these four members after seeking recommendations of established authorities or organizations in the above specified fields. The member's term of office shall be four years, except that the terms of those first appointed shall expire as follows:

1 at the end of 1 year after such date,
1 at the end of 2 years after such date,
1 at the end of 3 years after such date, and
1 at the end of 4 years after such date

as designated by the Governor at the time of appointment. If a vacancy occurs, the Governor shall appoint a member for the remaining portion of that term. The director of the agency shall be chairman of the board. The board shall hold four regular meetings each calendar year, and special meetings as deemed necessary by the board or the director. It shall be the duty of the board to review the policies and program of the agency as developed under authority of this act; to make recommendations thereon to the agency; to provide the agency with such technical advice and assistance as may be required relative to permissible exposure levels, standards of practice, radiation instrumentation, and other technical matters. Members of the board, other than the director, shall be entitled to receive compensation at _____ dollars per diem and reimbursement for actual and necessary traveling and subsistence expenses while engaged in the business of the board.

SECTION 4. Powers and Duties of the Agency. The agency shall have the following powers and duties:

(a) Shall develop comprehensive policies and programs for the evaluation and determination of hazards associated with the use of radiation, and for their amelioration;

(b) Shall advise, consult and co-operate with other agencies of the State, the Federal Government, other states and interstate agencies, and with affected groups, political subdivisions, and industries in furtherance of the purposes of this act;

(c) May accept and administer loans, grants, or other funds or gifts from the Federal Government and from other sources, public or private, for carrying out any of its functions;

(d) May encourage, participate in, or conduct studies, investigations, training, research, and demonstrations relating to the control of radiation hazard, the measurement of radiation, the effects on health of exposure to radiation, and related problems as it may deem necessary or advisable for the discharge of its duties under this act;

(e) Shall collect and disseminate information relating to the determination and control of radiation exposure and hazard;

(f) Shall adopt and promulgate such rules and regulations as may be necessary to further the purposes of this act; such rules and regulations may incorporate by reference the recommended standards of nationally

recognized bodies in the field of radiation protection such as the National Committee on Radiation Protection or the American Standards Association;

(g) Shall devise, modify, repeal, promulgate, and enforce rules and regulations as necessary to implement or effectuate the powers and duties of the agency under this act;

(h) May issue, modify, or revoke orders prohibiting or abating the discharge of radioactive material or waste into the ground, air, or waters of the State in accordance with the provisions of this act and rules and regulations adopted thereunder;

(i) Upon request, shall render opinion concerning such plans and specifications on the design and shielding for radiation sources as may be submitted before or after construction, for the purpose of determining the possible radiation hazard;

(j) May make inspections of radiation sources, shielding, and immediate surroundings for the determination of any possible radiation hazard; and shall provide the owner, user, or operator thereof with a report of any known or suspected deficiencies;

(k) May exercise all incidental powers necessary to carry out the purposes of this act.

SECTION 5. Registration.

(a) It shall be unlawful for any person to produce radiation, or to produce, use, store, or dispose of radioactive materials, or to modify, extend, or alter such activities, unless he registers in writing with the agency in accordance with the procedures prescribed by such agency, except that a period of 90 calendar days shall be allowed for such registration after the effective date of this act.

(b) It shall be unlawful for any person to produce radiation, or to produce, use, store, or dispose of radioactive materials, except in accordance with the provisions of this act and rules and regulations promulgated thereunder.

SECTION 6. Classification of Sources and Hazards and Standards of Protection.

(a) The agency is authorized, with the concurrence of the board, to classify radiation sources, exposures, and hazards for the purpose of (1) making inspections, (2) determining the competence of the radiation users, (3) determining the adequacy of radiation-protective devices and procedures, and (4) other purposes compatible with the present and future utilization of all forms of radiation, taking into account the protection of the health of the people of this State.

(b) Prior to the establishment of a system of classification of sources or uses, or setting standards of protection, or modifying such classifications or standards, the agency shall conduct public hearings in connection therewith. Notice shall be given of time, date, and place of public hearing and shall specify the technical area in which a classification is sought to be made or for which standards are sought to be adopted. Such notice shall be published at least twice in a newspaper of general circulation in the area affected, and shall be mailed at least 20 days before such public hearing to the chief executive of each political subdivision of the geographical area affected, and may be mailed to such other persons as the agency has reason to believe may be affected by such classification and the setting of such standards.

The agency shall utilize the assistance of the board in connection with such hearings.

(c) The adoption of standards of protection and the classification of radiation sources, or any modification or change thereof, shall, upon approval of the board, be issued as an order of the agency and shall be published in a newspaper of general circulation in the area affected. In classifying sources and setting radiation-protection standards, or making any modification thereof, the agency shall permit and announce a reasonable time for the persons or users involved to comply with such classification and standards, if their operations create a known hazard to health; except that a user may be directed to abate without delay a serious known hazard to health.

SECTION 7. Examination for Compliance: Statement of Noncompliance.

(a) The agency shall itself, or by its duly designated representatives, inspect and examine such sources of radiation as it desires, in order to determine their compliance with the adopted classification and radiation-protection standards of the agency.

(b) If such inspection and examination indicates that the source of radiation is not in compliance with the adopted classification and radiation-protection standards, the owner, operator, or user shall be so notified in writing, with full particulars regarding any deficiencies.

SECTION 8. Proceedings Before Board.

(a) Whenever the agency determines there are reasonable grounds to believe that there has been a violation of any of the provisions of this act or of any order of the agency, it may give written notice to the alleged violator or violators specifying the causes of complaint. Such notice shall require that the alleged violations be corrected or that the alleged violator appear before the agency at a time and place specified in the notice, and answer the charges. The notice shall be delivered to the alleged violator or violators in accordance with the provisions of subsection (d) of this section not less than _____ days before the time set for the hearing.

(b) The agency shall afford the alleged violator or violators an opportunity for a fair hearing in accordance with the provisions of Section 9 at the time and place specified in the notice or any modification thereof. On the basis of the evidence produced at the hearing the agency shall make findings of fact and conclusions of law and enter such order as in its opinion will best further the purposes of this act and shall give written notice of such order to the alleged violator, and to such other persons as shall have appeared at the hearing and made written request for notice of the order. If the hearing is held before any person other than the agency itself such person shall transmit the record of the hearing together with recommendations for findings of fact and conclusions of law to the agency, which shall thereupon enter its order on the basis of such record and recommendations. The order of the agency shall become final and binding on all parties unless appealed to the courts as provided in Section 12 within _____ days after notice has been sent to the parties.

(c) Whenever the agency finds that an emergency exists requiring immediate action to protect the public health or welfare, it may, without notice or hearing, issue an order reciting the existence of such an

emergency and requiring that such action be taken as it deems necessary to meet the emergency. Notwithstanding the provisions of subsection (b) of this section, such order shall be effective immediately. Any person to whom such order is directed shall comply therewith immediately, but on application to the agency shall be afforded a hearing as soon as possible. On the basis of such hearing the agency shall continue such order in effect, revoke it, or modify it.

(d) Except as otherwise expressly provided, any notice, order, or other instrument issued by or under authority of the agency may be served, personally or by publication, on any person affected thereby, and proof of such service may be made in like manner as in case of service of a summons in a civil action, such proof to be filed in the office of the agency; or such service may be made by mailing a copy of the notice, order, or other instrument by registered mail, directed to the person affected at his last known post office address as shown by the files or records of the agency, and proof of such service may be made by the affidavit of the person who did the mailing, such proof to be filed in the office of the agency.

(e) Every certificate or affidavit of service made and filed as herein provided shall be prima facie evidence of the facts therein stated, and a certified copy thereof shall have like force and effect.

SECTION 9. Hearings. The hearings herein provided may be conducted by the director, or the director may designate hearing officers who shall have the power and authority to conduct such hearings in the name of the agency, at any time and place. A record or summary of the proceedings of such hearings shall be made and filed with the agency, together with findings of fact and conclusions of law made by the agency. A member of the agency or a hearing officer, designated by the agency, shall have the power to issue in the name of the agency notice of the hearings or subpoenas requiring the testimony of witnesses and the production of evidence relevant to any matter involved in such hearing, and to administer oaths and examine witnesses during such hearings. Witnesses who are subpoenaed shall receive the same fees and mileage as in civil actions. In case of contumacy or refusal to obey a notice of hearing or subpoena issued under this section, the _____ Court shall have jurisdiction, upon application of the agency or its representative, to issue an order requiring such person to appear and testify or produce evidence as the case may require, and any failure to obey such order of the court may be punished by such court as contempt thereof.

SECTION 10. Inspections and Investigations: Maintenance of Records. The agency or its duly authorized representative shall have the power to enter at reasonable times, and after prior notice of at least two days, upon any private or public property for the purpose of inspecting and investigating conditions relative to the purposes of this act; except that such entry into security areas under the direct or indirect jurisdiction of the Federal Government shall be permitted only by and with the concurrence of the Federal Government agency or its duly designated representative.

Any authorized representative of the agency may examine any records or memoranda pertaining to the operation of radiation machines and radioactive materials. The agency may require the maintenance

of records relating to the operation of disposal systems. Copies of such records must be submitted to the agency on request.

SECTION 11. Penalties: Injunctions.

(a) Any person who violates any of the provisions of, or who fails to perform any duty imposed by, this act, or who violates any order of the agency promulgated pursuant to this act, shall be guilty of a misdemeanor, and in addition thereto may be enjoined from continuing such violation. Each day upon which such violation occurs shall constitute a separate violation.

(b) It shall be the duty of the Attorney General on the request of the agency to bring any action for an injunction against any person violating the provisions of this act, or violating any order of the agency. In any action for an injunction brought pursuant to this section, any findings of the agency after hearing or due notice shall be prima facie evidence of the fact or facts found therein.

SECTION 12. Review.

(a) An appeal may be taken from any final order, or other final determination of the agency, by any person who believes himself adversely affected thereby, or by the Attorney General on behalf of the State of the _____ Court of the State in the area affected or to the _____ Court of (Seat of government). Within 30 days after receipt of a copy of the order, or other determination, or after service of notice thereof by registered mail, the appellant or his attorney shall serve a notice of appeal on the agency through its (director) provided that during such 30-day period the court may, for good cause shown, extend such time for an additional period not to exceed 60 days. The notice of appeal shall refer to the action of the agency appealed from, shall specify the grounds of appeal, including both points of law and fact which are asserted or questioned by the appellant. A copy of the original notice of appeal with proof of service shall be filed by the appellant or his attorney with the clerk of the court within 10 days of the service of the notice and thereupon the court shall have jurisdiction of the appeal.

(b) The appellant and the agency shall in all cases be deemed the original parties to an appeal. The State, through the Attorney General or any other person affected, may become a party by intervention, as in a civil action, upon showing cause therefor. The Attorney General shall represent the agency, if requested, upon all such appeals unless he appeals or intervenes in behalf of the State. If the Attorney General or a member of his staff is not available to represent the agency in any particular proceeding, the agency is empowered to appoint special counsel for such proceeding. No bond or deposit for costs shall be required of the State or agency upon any such appeal or upon any subsequent appeal to the Supreme Court or other court proceedings pertaining to the matter.

(c) The appeal shall be heard and determined by the court upon the issues raised by the notice of appeal and the answer thereto according to the rules relating to a trial in the nature of an appeal in equity of an administrative determination. All findings of fact by the agency are to be deemed final, unless it is shown that such findings were not supported by substantial evidence produced before the agency at the hearing. In any appeal or other proceeding involving any order, or other determination of the agency, the action of the agency shall be

prima facie evidence reasonable and valid and it shall be presumed that all requirements of the law pertaining to the taking thereof have been complied with. A copy of the proceedings before the agency shall be certified to the court in connection with each appeal.

(d) A further appeal may be taken to the Supreme Court of the State in the same manner as appeals in equity are taken.

SECTION 13. Conflicting Laws. This act shall not be construed as repealing any laws of the State relating to radiation sources, exposures, radiation protection, and professional licensure, but shall be held and construed as auxiliary and supplementary thereto, except to the extent that the same are in direct conflict herewith.

SECTION 14. Existing Rights and Remedies Preserved. It is the purpose of this act to provide additional and cumulative remedies to evaluate, control, and prevent impairment to health from radiation and to encourage the constructive use of radioactive materials and radiation machines. Nothing herein contained shall be construed to abridge or alter rights of action or remedies in equity or under the common law or statutory law, criminal or civil, nor shall any provision of this act, or any act done by virtue thereof, be construed as estopping the State, or any municipality or person, in the exercise of their rights in equity or under the common law or statutory law to protect the public health and encourage commerce and industry.

SECTION 15. Severability. If any section, subsection, sentence, clause, phrase, or word of this act is for any reason held to be unconstitutional, such decree shall not affect the validity of any remaining portion of this act.

SOURCE: U. S. Department of Commerce, National Bureau of Standards, *Regulation of Radiation by Legislative Means,* Handbook 61, 1955.

C. THE AMERICAN PUBLIC HEALTH ASSOCIATION, INC., MODEL STATE RADIATION PROTECTION ACT (With Commission) 1958

An Act relating to radiation protection, creating a Commission on Radiation Protection in the _____ and prescribing functions, powers and duties relating to prevention and prohibition of unnecessary radiation.

(Insert proper title of State health agency)

Be it enacted by_____

(Insert enacting clause proper for particular state)

1. *Title*

This act shall be known and may be cited as the "Radiation Protection Act."

2. *Public Policy*

Whereas ionizing radiations and their sources can be instrumental in the improvement of health, welfare and productivity of the public if properly utilized, and may be destructive of life or health if carelessly or excessively employed, or may impair the industrial and agricultural potentials of the State if improperly utililized, it is hereby declared to be the public policy of this State to encourage the constructive uses of radiation and to prohibit and prevent unnecessary radiation.

3. *Definitions* *

The following words shall have the following meanings:

"Commission" means the Commisison on Radiation Protection created under this act;

"Department" means _____

(Insert proper title of state health agency)

"Unnecessary radiation as used in this act means the use of gamma rays, X-rays, alpha and beta particles, high speed electrons, neutrons, protons and other atomic or nuclear particles or rays in such manner as may be hazardous† to the health of the people or the industrial or agricultural potentials of the state.

4. *Commisison Created*

There is hereby created in the _____ a Commission on Radiation Protection, which shall consist of _____ members _____ of whom shall be: the _____

(Insert proper title of head of state health agency)

or a member of the _____

(Insert proper title of state health agency)

designated by him _____

(Similarly insert proper titles of heads of other state agencies to be represented on commission and their designees)

who shall serve ex officio and _____ members with scientific training and experience in medicine, radiology, radiation physics,

* Insert definition of person if necessary.

† Alternate suggestion for phrase "may be hazardous" is "may be injurious to the individual or is injurious."

atomic energy, or biology to be appointed from persons to be nominated by the organizations hereinafter enumerated, by the Governor with the advice and consent of the _____
(Insert title of legislative body of the state)
_____.

On or before _____ and thereafter as required, at least one month prior to the expiration of the term of the member chosen from nominees of each organization hereafter enumerated, each such organization shall submit to the Governor a list of three recommended nominees for membership on the commission from which list the Governor shall appoint one.

If any organization does not submit a list of recommended nominees at any time required by this act, the Governor may appoint a member of his choice.

The organizations which shall be entitled to submit recommended nominees are: _____

_____

_____

_____

(List appropriate organizations in the State)

5. *Term of Office of Commissioners*

Of the _____ members first to be appointed, one shall be appointed for a term of one year, one for a term of two years, two for terms of three years and two for terms of four years beginning on _____. Thereafter, all appointments shall be made for terms of four years beginning on _____. All appointed members shall serve after the expiration of their terms until their respective successors are appointed and shall qualify, and any vacancy occurring in the appointed membership of the commisison, by expiration of term or otherwise, shall be filled in the same manner as the original appointment for the unexpired term only, notwithstanding that the previous incumbent may have held over and continued in office as aforesaid. The Governor may remove any appointed member of the commission for cause after a hearing.

6. *Expenses of Commission*

All members of the commission shall serve without compensation but shall be reimbursed for expenses incurred in attending meetings of the commission and in the performance of any duties as members thereof.

7. *Commission Officers*

The chairman of the commission shall be the _____
(Insert proper title of head of state health agency)
_____. _____ members of the commission shall constitute a quorum to transact its business, except that action on codes, rules, and regulations shall be by at least a two-thirds vote of the entire commission.

8. *Commission Meetings*

The commission shall hold at least _____ regular meetings each calendar year, and such special meetings as it deems necessary.

9. *Rules and Regulations*

The commission shall have power to formulate and promulgate, amend and repeal codes and rules and regulations, including registration of sources of radiation, as may be necessary to prohibit and prevent unnecessary radiation provided, however, that no such code, rule or regulation and no such amendment or repeal shall be adopted except after public hearing to be held after _____ days prior notice thereof by public advertisement of the date, time and place of such hearing, at which opportunity to be heard by the commission with respect thereto shall be given to the public; and provided, further, that no such code, rule or regulation and no such amendment or repeal shall be or become effective until _____ days after the adoption thereof as aforesaid. Any person heard at such public hearing shall be given written notice of the determination of the commission.

10. *Duty of Commission*

It shall be the duty of the commission to review the policies and program of the department as developed under authority of this act; to make recommendations thereon to the department; to provide the department with such technical advice and assistance as may be requested by the department.

11. *Functions and Powers of Department*

The department shall:

(a) Administer this act and codes, rules, or regulations promulgated by the commission;

(b) Develop comprehensive policies and programs for the evaluation and determination of hazards associated with the use of radiation, and for their amelioration;

(c) Advise, consult, and co-operate with other agencies of the State, the Federal Government, other states and interstate agencies, and with affected groups, political subdivisions, and industries;

(d) Accept and administer according to law loans, grants, or other funds or gifts from the Federal Government and from other sources, public or private, for carrying out its functions under this act;

(e) Encourage, participate in, or conduct studies, investigations, training, research, and demonstrations relating to the control of radiation hazard, the measurement of radiation, the effects on health of exposure to radiation and related problems as it may deem necessary or advisable for the discharge of its duties under this act;

(f) Collect and disseminate health education information relating to radiation protection;

(g) Review * plans and specifications for radiation sources submitted pursuant to codes, rules or regulations promulgated under this act;

*Alternate wording: Review and approve.

(h) Inspect radiation sources, their shielding and immediate surroundings and records concerning their operation for the determination of any possible radiation hazard;

(i) All data obtained as a result of registrations, inspections or investigations shall be kept confidential by the department.

12. *Use of Radiation Sources*

All sources of radiation shall be shielded, transported, handled, used and kept in such manner as to prevent all users thereof and all persons within effective range thereof from being exposed to unnecessary radiation.

13. *Notification of Violation and Order of Abatement*

Whenever the department finds upon inspection and examination of a source of radiation as constructed, operated or maintained that there has been a violation of any of the provisions of this act or any codes, rules or regulations promulgated under this act, it shall notify any person found to be causing, allowing or permitting such violation, of the nature of that violation and order that prior to a time fixed by the department, which time shall not be later than _____ from the date of service of the notice, that
(Reasonable period of time)
such person shall cease and abate causing, allowing or permitting such violation and take such action as may be necessary for the source of radiation to be constructed, operated or maintained in compliance with this act and codes, rules or regulations promulgated by the commission.

Any person aggrieved by the finding or order of the department may bring a civil action in the _____ court at any time within three months after being notified thereof, and said court may hear and determine such action in which the court may proceed in a summary manner or otherwise, and thereupon may affirm the finding or order of the department or reverse or modify the finding or order of the department in whole or in part as the court shall deem just and reasonable.

14. *Authority of Department in Cases of Emergency*

Whenever the department finds that an emergency exists requiring immediate action to protect the public health or welfare, it may issue an order reciting the existence of such an emergency and requiring that such action be taken as it deems necessary to meet the emergency. Such order shall be effective immediately. Any person to whom such an order is directed shall comply therewith immediately, but on application to the department shall be afforded a hearing within _____ days. On the basis of such hearing, the department shall continue such order in effect, revoke it, or modify it.

15. *Injunctive Relief*

A civil action may be instituted in the _____ Court on behalf of the department for injunctive relief to prevent the violation of the provisions of this act or codes, rules or regulations promulgated under this act, and said court may proceed in the action in a sum-

mary manner or otherwise and may restrain in all such cases any person from violating any of the provisions of this act or said codes, rules or regulations.

16. *Exceptions*

Nothing in this act shall be interpreted as limiting intentional exposure of patients to radiation for the purpose of diagnosis or therapy, or medical research, as authorized by law.

17. *Conflicting Laws*

This act shall not be construed as repealing any laws of the State relating to radiation sources, exposures, radiation protection, and professional licensure, but shall be held and construed as auxiliary and supplementary thereto, except to the extent that the same are in direct conflict herewith.*

No ordinances or regulations of any governing body of a municipality or county or board of health not inconsistent with this act or any code, rules or regulations promulgated pursuant thereto shall be superseded by this act. Nothing in this act or in any code, rules or regulations promulgated pursuant thereto shall preclude the right of any governing body of a municipality or county or board of health to adopt ordinances or regulations not inconsistent with this act or any code, rules or regulations promulgated pursuant thereto.

18. *Existing Remedies Unimpaired*

No existing civil or criminal remedy for any wrongful action which is a violation of any code, rule or regulation promulgated under this act shall be excluded or impaired by this act.

19. *Review*

Review of any code, rule or regulation promulgated under this act shall be by appeal to the _____ Court.

20. *Severability*

If any section, subsection, sentence, clause, phrase, or word of this act is for any reason held to be unconstitutional, such decree shall not affect the validity of any remaining portion of this act.

21. *Protection of Powers*

The powers, duties and functions vested in the_____
(Insert proper title
_____ under the provision of this act shall not be construed
of state health agency)
to affect in any manner the powers, duties and functions vested in the _____ under any other provisions
(Insert proper title of state health agency)
of law.

22. *Effective Date*

This act shall take effect _____.

* It may be desired to delete this paragraph. If so, at the end of Section 21 entitled "Protection of Powers" add the following phrase: "or those of the _____
(State Stream Pollution and Air Pollution Control Agencies)

D. THE AMERICAN PUBLIC HEALTH ASSOCIATION, MODEL STATE RADIATION PROTECTION ACT (Without Commission)

(Section headings inserted for ready reference—they would not be included in a bill as might be introduced before a state legislature)

An act relating to radiation protection and prescribing functions, powers and duties relating to prevention and prohibition of unnecessary radiation.

Be it Enacted by _____
(Insert enacting clause proper for particular state)

1. *Title*
This act shall be known and may be cited as the "Radiation Protection Act."

2. *Public Policy*
Whereas ionizing radiations and their sources can be instrumental in the improvement of health, welfare and productivity of the public if properly utilized, and may be destructive of life or health if carelessly or excessively employed, or may impair the industrial and agricultural potentials of the state if improperly utilized, it is hereby declared to be the public policy of this state to encourage the constructive uses of radiation and to prohibit and prevent unnecessary radiation.

3. *Definitions* *
The following words as used in this act shall have the following meanings:
"Department" means _____
(Insert proper title of State Health agency)
"Unnecessary radiation" means the use of gamma rays, X-rays, alpha and beta particles, high speed electrons, neutrons, protons, and other atomic or nuclear particles or rays in such manner as may be hazardous † to the health of the people or the industrial or agricultural potentials of the state.

4. *Rules and Regulations*
The _____
(State Board of Health—Public Health Council or department as may be desired)
shall have power to formulate and promulgate, amend and repeal codes and rules and regulations including registration of sources of radiation as may be necessary to prohibit and prevent unnecessary radiation provided however, that no such code, rule or regulation and no such amendment or repeal shall be adopted except after public hearing to be held after _____ days prior notice thereof by public advertisement of the date, time and place of such hearing, at which opportunity to be heard by the _____
(State Board of
_____ with respect
Health—Public Health Council or department as may be desired)

* Insert definition of person if necessary.
† Alternate suggestion for phrase "may be hazardous" is "may be injurious to the individual or is injurious."

thereto shall be given to the public; and provided, further, that no such code, rule or regulation and no such amendment or repeal shall be or become effective until _____ days after the adoption thereof as aforesaid. Any person heard at such public hearing shall be given written notice of the determination of the _____

(State Board of

_____

Health—Public Health Council or department as may be desired)

5. *Functions and Powers of Department*
The department shall:
   a) Administer this act and codes, rules, or regulations promulgated under this act;
   b) Develop comprehensive policies and programs for the evaluation and determination of hazards associated with the use of radiation, and for their amelioration;
   c) Advise, consult, and cooperate with other agencies of the state, the Federal Government, other States and interstate agencies, and with affected groups, political subdivisions, and industries;
   d) Accept and administer according to law loans, grants, or other funds or gifts from the Federal Government and from other sources, public or private, for carrying out its functions under this act;
   e) Encourage, participate in, or conduct studies, investigations, training, research, and demonstrations relating to the control of radiation hazard, the measurement of radiation, the effects on health of exposure to radiation, and related problems as it may deem necessary or advisable for the discharge of its duties under this act;
   f) Collect and disseminate health education information relating to radiation protection;
   g) Review* plans and specifications for radiation sources submitted pursuant to codes, rules or regulations promulgated under this act;
   h) Inspect radiation sources, their shielding and immediate surroundings and records concerning their operation for the determination of any possible radiation hazard;
   i) All data obtained as a result of registrations or investigations shall be kept confidential by the Department.

6. *Use of Radiation Sources*
All sources of radiation shall be shielded, transported, handled, used and kept in such a manner as to prevent all users thereof and all persons within effective range thereof from being exposed to unnecessary radiation.

7. *Notification of Violation and Order of Abatement*
Whenever the department finds upon inspection and examination of a source of radiation as constructed, operated or maintained that there has been a violation of any of the provisions of this act or any codes, rules or regulations promulgated under this act, it shall notify any person found to be causing, allowing or permitting such violation, of the nature of that violation and order that prior

* Alternate wording: Review and approve.

to a time fixed by the department, which time shall not be later than _____ from the date of service of the notice,
(Reasonable period of time)
that such person shall cease and abate causing, allowing or permitting such violation and take such action as may be necessary for the source of radiation to be constructed, operated or maintained in compliance with this act and codes, rules or regulations promulgated under this act. Any person aggrieved by the finding or order of the department may bring a civil action in the _____ Court at any time within three months after being notified thereof; and said court may hear and determine such action in which the court may proceed in a summary manner or otherwise, and thereupon may affirm the finding or order of the department or reverse or modify the finding or order of the department in whole or in part as the court shall deem just and reasonable.

8. *Authority of Department in Cases of Emergency*
Whenever the department finds that an emergency exists requiring immediate action to protect the public health or welfare, it may issue an order reciting the existence of such an emergency and requiring that such action be taken as it deems necessary to meet the emergency. Such order shall be effective immediately. Any person to whom such order is directed shall comply therewith immediately, but on application to the Department shall be afforded a hearing within_____days. On the basis of such hearing the department shall continue such order in effect, revoke it, or modify it.

9. *Injunctive Relief*
A civil action may be instituted in the_____Court on behalf of the department for injunctive relief to prevent the violation of the provisions of this act or codes, rules or regulations promulgated under this act, and said court may proceed in the action in a summary manner or otherwise and may restrain in all such cases any person from violating any of the provisions of this act or said codes, rules or regulations.

10. *Exceptions*
Nothing in this act shall be interpreted as limiting intentional exposure of patients to radiation for the purpose of diagnosis or therapy, or medical research, as authorized by law.

11. *Conflicting Laws*
This act shall not be construed as repealing any laws of the state relating to radiation sources, exposures, radiation protection, and professional licensure, but shall be held and construed as auxiliary and supplementary thereto, except to the extent that the same are in direct conflict herewith. * No ordinances or regulations of any governing body of a municipality or county or board of health not inconsistent with this act or any code, rules or regulations promul-

* It may be desired to delete this paragraph—if so, it is suggested that the following phrase be added at the end of Section 15 entitled "Protection of Powers"—"or those of the _____
(Insert proper title of state stream pollution and air pollution control agencies)

gated pursuant thereto shall be superseded by this act. Nothing in this act or in any code, rules, or regulations promulgated pursuant thereto shall preclude the right of any governing body of a municipality or county or board of health to adopt ordinances or regulations not inconsistent with this act or any code, rules or regulations promulgated pursuant thereto.

12. *Existing Remedies Unimpaired*
No existing civil or criminal remedy for any wrongful action which is a violation of any code, rule or regulation promulgated under this act shall be excluded or impaired by this act.

13. *Review*
Review of any code, rule or regulation promulgated under this act shall be by appeal to the _____Court.

14. *Severability*
If any section, subsection, sentence, clause, phrase, or word of this act is for any reason held to be unconstitutional, such decree shall not affect the validity of any remaining portion of this act.

15. *Protection of Powers*
The powers, duties and functions vested in the_____under the
(Insert proper title of state health agency)
provisions of this act shall not be construed to affect in any manner the powers, duties and functions vested in the_____ under any
(Insert proper title of state health agency)
other provisions of law.

16. *Effective Date*
This act shall take effect_____.

APPENDIX III

THE UNIVERSITY OF CALIFORNIA
UNIVERSITY-WIDE COMMITTEE ON RADIOLOGICAL SAFETY
REPORT ON RADIATION SAFETY LEGISLATION [1]

December 16, 1958

A radiation protection program for the State of California is necessary for the following reasons:

I—The use of ionizing radiation is increasing in the following fields:

(a) Medical use.
  1. Clinical.
  2. Research.
  3. Educational.

(b) Industrial use.
  1. Applied.
  2. Research.
  3. Educational.

(c) Environmental Contamination.
  1. Weapon tests.
  2. Industrial wastes.
  3. Medical wastes.

(d) AEC laboratory activities.

At this time the amount of exposure to ionizing radiation in many areas is based on estimates from a relatively few sample studies. Further, the amount of exposure is a variable quantity depending on geography, weather and population segments analyzed.

II—The people of California could be exposed to undesirable amounts of ionizing radiation if the present development of use is allowed to continue without knowledge and control as to the amount of exposure received by the people.

III—The present programs of Radiation Protection, nationally and within the State, have not been designed to meet the requirements of the people of the State of California.

Therefore, it is the unanimous recommendation of this Subcommittee that the State of California establish without delay a—

STATE OF CALIFORNIA RADIATION PROTECTION AGENCY

1. To be composed of a commission of experts and an executive staff.
2. To develop and recommend a program for radiation protection within the State (upon adoption of the program, the commis-

[1] At the time this report was submitted to the Assembly Interim Committee on Public Health, there had "not been sufficient time to present it for review and approval by the President and the Board of Regents. Accordingly, the program proposed in the report should be accepted only as a statement of recommendations to the university administration by a committee of experts in the field of radiation protection; and should not be looked upon as the official recommendations of the University of California." Letter to Committee from Richard J. Stull, Vice President, Medical and Health Sciences, University of California, December 4, 1958.

sion to be given the powers and responsibilities necessary to effectively coordinate radiation protection activities on a statewide basis, to develop approximate radiation safety standards, and to provide information, advice and assistance to the various State departments and agencies concerned with radiation protection).

3. To prevent contradictory, conflicting or unduly restrictive regulations of the use of ionizing radiation.
4. To evaluate within reasonable limits the continuing exposure of the people of the State of California.
5. To establish what amounts of exposure will be deemed a hazard.
6. To recommend abatement of hazardous exposure conditions.
7. To discharge these responsibilities wherever possible through existing state departments according to their field of interest.
8. To do this in the most economical way possible.

It appears unlikely that any single existing department or staff could discharge the responsibilities of the proposed agency for the following reasons:

A—Radiation protection is required in fields of activity such as—

a. Medical use.
b. Industrial use and occupational health.
c. Sanitation.
d. Waste disposal.
   1. Water pollution.
   2. Air pollution.
e. Agriculture.
f. Microbiology.
g. Animal husbandry.
h. Fish and game.
i. Educational and research use.
j. AEC laboratory activities.
k. Oceanography.
l. Transportation.

This involvement requires specialized competence unavailable in any single person or department. Therefore, it is recommended that—

The responsibility to determine the program of radiation protection in the State of California be delegated to a commission of experts with interests and experience in the major fields of activities requiring radiation protection.

There should also be available consultants in the minor fields of activity. It is further recognized that the major fields of interest may change as the use of ionizing radiation progresses and the commission should reflect such change by increasing or changing the experts making up the commission.

The regulations pertaining to use of ionizing radiation will emanate from the departments according to their fields of responsibility, however, such proposed regulations must be submitted to or evolved in consultation with the Radiation Protection Agency before adoption.

The commission will have the responsibility of preventing conflicting or unduly restrictive regulations. To this end the agency will maintain

and publish the combined regulations pertaining to ionizing radiation gathered from all departments who so regulate.

The enforcement of issued regulations will be the responsibility of the department issuing the regulations.

The abatement of hazardous conditions shall be the duty of the existing departments according to their fields of responsibility upon violation of established regulations or upon advice from the state commission.

In order to discharge the responsibilities of the commission it is further recommended that the commission be furnished a *Staff Agency* of Radiation Protection to carry out the following activities and services:

1. To work with other state agencies to carry out for radiation protection the program adopted by the commission.
2. To avoid unnecessary duplication of—
   a. Regulations,
   b. Programs,
   c. Instruments,
   d. Personnel.
3. To carry out the program adopted by the commission.
4. To maintain a registry of all sources of ionizing radiation designated by the commission for registration.
5. To gather and centralize a continuing estimate of the exposure of the people of the State to ionizing radiation.
6. To assist state agencies with technically skilled personnel and equipment.
7. Maintain sufficient radiological laboratory facilities and instruments to discharge the duties and provide the services required by other state departments.
8. To act as the executive branch of the state commission.
9. To supply training and educational services to other state agencies.

We believe such a program and organization will best serve the needs of the people of the State of California. We believe it will be the most economical way of providing the program. It allows the flexibility needed in the future development of use of ionizing radiation.

We believe that due to the probable changes in the importance of sources of exposure (i.e., a bomb test ban would effect the exposure from fallout; the development of atomic power stations would effect the potential exposure from occupation; the development of atomic reactor merchant ships would effect the interest of harbors and docking departments) the program should be in a separate highly skilled agency subject to modification to suit the needs of the State. It should not be a part of any existing state department since no department can discharge fully the needs of the program and its own interest without prejudice, and participation may change quite rapidly its own interest as progress changes the source of exposure.

Therefore, we recommend the commission and its staff agency be a separate agency serving the State in the manner described.

In formulating the preceding recommendations the committee recognized the following pertinent information:

1. At the national level the National Bureau of Standards publishes a large series of handbooks setting forth recommendations for radiation protection. The AEC also published recommendations.

   It has been found necessary to arrive at the content of these handbooks by means of committees for the same reasons set forth in our recommendations.
2. Recommendations of national and international bodies require interpretation and quantitative decisions. We believe this function can best be achieved by the recommended commission.
3. In the State of California the existing regulations of the Department of Industrial Safety have been reviewed and in one area critically examined by the chairman of the subcommittee in his particular field of interest.
4. This examination revealed examples of undue restriction and needless technical violation that could be prevented by changes in the orders that would fulfill the intent of the orders but remove in large measure their undesirable features.
5. The National Bureau of Standards handbooks were reviewed.
6. Previous proposed legislation in the State was reviewed.
7. Present and contemplated programs of existing departments were examined and discussed.
8. Fields of interest of various departments were reviewed taking into consideration the information published by the World Health Organization, the AEC, the U. S. Department of Health and Welfare, the National Bureau of Standards, plus various state organizations representing users and regulators of use.
9. The existing literature on the subject was reviewed.
10. The need for a superior, skilled agency staff is recognized, and the difficulty and expense of maintaining more than one skilled staff is emphasized.
11. Written recommendations of the subcommittee members were exchanged and recommendations of interested experts were reviewed.
12. Meetings were held to reconcile the differences and arrive at an acceptable proposal.
13. It was further recognized that radiation protection is divided into various categories requiring specialized skills and experience, namely—
    a. Recognition and evaluation of the hazard when the exposure is known requires the skill of a person with training and experience in the reaction of humans to ionizing radiation.
    b. Measurement of exposures requires a person skilled in the techniques and instruments required.
    c. Engineering ability in the particular field of design applicable to maintaining standards set by No. 4 below.
    d. The setting of standards of permissible exposure. Since there are no absolute standards these quantities remain matters of judgment and are best established by a commission made up of experts in the first three categories plus additional representatives from particular fields of major interest.

The recommendations submitted are now the unanimous opinion of the subcommittee as representing the best means of fulfilling the requirements of the people of the State of California and the interests of the various departments serving these requirements.

REYNOLD F. BROWN, M.D., Chairman
MR. NELSON GARDEN
DR. KENNETH SCOTT
DR. JOHN HESLEP

APPENDIX IV

REPORT OF THE GOVERNOR'S ADVISORY COMMITTEE ON PEACETIME USE OF RADIOLOGICAL MATERIALS TO GOVERNOR GOODWIN J. KNIGHT

December 11, 1958

The Governor's Advisory Committee on Peacetime Use of Radiological Materials met in Room 5100, State Capitol Annex, on December 9, 1958, at 10 a.m., for the purpose of reviewing the recommendations of the Staff Committee concerning necessary legislation to administer the radiation protection responsibilities of the several departments.

The committee considered in detail the report of its Staff Committee and adopted the following report which is herewith transmitted to you as a recommendation of your advisory committee.

1. For the most part department representatives on your committee felt there was little need for additions to or changes in the present statutes as applied to the programs of the specific departments at this time. Only the Departments of Public Health and Fish and Game have suggestions for possible additions to the statutes; these are discussed in paragraphs 4 and 5 below.

2. Your committee recognized the possible need or desirability of some legislation of a general type establishing policy in regard to radiation matters.

The committee felt that any such general legislation should embody the following principles:

a. Retention of the authorities and responsibilities of state departments and agencies in such manner as these may be applicable to radiation matters.
b. Provide for co-ordination of the activities of the several departments and agencies concerned in radiation matters.
c. Provide for a representative advisory committee to the Governor on radiation matters.
d. Provide for an interdepartmental advisory committee to the Governor.
e. Provide a single point of contact in State Government for the Atomic Energy Commission of the United States Government.
f. Provide for registration of all sources of ionizing radiation.

3. There was not unanimous agreement in the committee as to the mechanism for achieving these stated principles. The majority of the committee felt that there was not need to establish a special office, agency, or position to co-ordinate radiation activities of the several departments and agencies. The minority felt it desirable to provide for some such special mechanism.

Consequently, the committee wishes to submit alternate suggestions for proposed legislation for your consideration.

a. *Attachment 1* is submitted as proposed legislation which does not establish a special mechanism for an Office of Co-ordinator.
b. *Attachment 2* is submitted as proposed legislation, including provision for an Office of Co-ordinator.

4. *Attachment 3* is a suggested addition to the Health and Safety Code, outlining certain responsibilities of the State Department of Public Health. The department indicated that such legislation would be desirable if alternate No. 1 were adopted.

5. *Attachment 4* is a suggested addition to the Fish and Game Code. The Department of Fish and Game feels this proposed legislation is necessary whether or not general legislation is adopted. There has not yet been opportunity to work out in the staff committee all of the ramifications of this proposal, insofar as departments other than Fish and Game are concerned.

Attachment 1

An act to add Chapter 8 to Division 20 of the Health and Safety Code, relating to atomic energy and ionizing radiation

CHAPTER 8. ATOMIC ENERGY AND IONIZING RADIATION

2550. The Legislature recognizes that the production and utilization of ionizing radiation, including that from atomic energy applications, for peaceful purposes has already resulted in, and will necessarily continue to result in, conditions calling for changes in the laws of the State and rules and regulations issued thereunder with respect to, but not limited to, public health and safety, industrial safety, workman's compensation, transportation, public utilities, insurance, conservation of natural resources, including wildlife, protection of streams, rivers, lands, and space from contamination and pollution, agriculture, education, and others, and hereby declares the policy of the State is:

(a) To adapt its laws and regulations so as to encourage the development of beneficial uses of ionizing radiation and nuclear energy while at the same time protecting the public interest and the State's resources.

(b) To have State agencies retain their traditional authorities and responsibilities whenever possible.

(c) That the various departments and agencies of the State which are concerned with radiation and its various applications and uses shall develop programs designed to protect the people of the State from unnecessary exposure.

(d) To assure the co-ordination of the programs of the state agencies and the laws, rules and regulations incident thereto, and to insure co-ordination of these activities with the development and regulatory activities of local agencies, other states, and the Government of the United States.

25501. As used in this chapter, the following terms have the meanings described in this section:

(a) "State agency" means every state office, board, commission, authority, department, division and bureau, and is intended to be all-inclusive.

(b) "Atomic energy" means all forms of energy released in the course of nuclear transformation.

(c) "Byproduct material" means any radioactive materials (except special nuclear materials) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear materials.

(d) "Production facility" means (1) any equipment or device capable of the production of special nuclear material in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public; or (2) any important component part especially designed for such equipment or device.

(e) "Special nuclear material" means (1) plutonium and uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Governor declares by order to be special nuclear material after the United States Atomic Energy Commisison has determined the material to be such; or (2) any material artificially enriched by any of the foregoing.

(f) "Utilization facility" means (1) any equipment or device, except an atomic weapon, capable of making use of special nuclear materials in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public, or peculiarly adapted for making use of atomic energy in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public; or (2) any important component part especially designed for such equipment or device.

(g) "Ionizing radiation," or "radiation," as used in this chapter, means any or all of the following forms of ionizing radiation: alpha rays, beta rays, gamma rays, X-rays, neutrons, high-speed electrons, and other atomic particles, but not sound or radio waves, or visible, infrared, or ultraviolet light.

(h) "Radioactive material" means any compound or element which may emit any or all of the following: alpha and beta particles, electrons, protons, neutrons, and gamma and all other emissions which produce ionization directly or indirectly.

25502. The State Department of Public Health shall be the point of contact for the Atomic Energy Commission and with state governments in matters pertaining to atomic energy and ionizing radiation, except for those cases of disaster and extreme emergency covered by other regulations. This is not intended to prohibit such direct communication between agencies as might be required.

25503. It is unlawful for any person to manufacture, construct, produce, transfer, acquire, use or possess any special nuclear material, byproduct material, production facility, or utilization facility, or act as an operator of a production or utilization facility wholly within this State unless he shall have first obtained a license or permit for the activity in which he proposes to engage from the United States Atomic Energy Commission if the commission requires a license or permit to be obtained by persons proposing to engage in such activities. Violation of this section is a misdemeanor.

25504. There is hereby created an Advisory Conference on Atomic Energy and Ionizing Radiation, consisting of 15 members, including at least one representative each from industry, labor, medicine, science, education, law, local government, and State Government. The conference shall advise the Governor regarding developments and problems in the uses of atomic energy and ionizing radiation. Members of the conference shall be appointed by the Governor. Of the members first appointed, the Governor shall designate five to serve until October 1, 1960, five to serve until October 1, 1961, and five to serve until October 1, 1962. Thereafter all members shall be appointed for three-year terms, except that members appointed to fill vacancies occurring prior to the expiration of a term shall be appointed for the remainder of such term. The Governor shall annually on October 1st designate one member of the conference to serve as chairman, and the chairman shall call meetings of the conference at least twice each year. Conference members shall receive no compensation but shall be entitled to receive their actual and necessary travel and subsistence expenses while serving on business of the conference.

25505. There is hereby created the State Committee on Atomic Energy and Ionizing Radiation which shall consist of the heads of the following state departments and agencies, or the individual designated by the head of such department or agency to represent it: Public Health, Industrial Relations, Water Resources, Natural Resources, Fish and Game, State Water Pollution Control Board, Disaster Office, Attorney General, Agriculture, Education, Finance, University of California, Public Utilities Commission, and such other state departments or agencies as the Governor may indicate. The chairman of the committee shall be annually designated by the Governor. The committee may designate and appoint technical consultants to advise the committee in matters relating to ionizing radiation and atomic energy. The committee shall meet at least once every four months to co-ordinate the programs and activities of the respective state departments and agencies in matters pertaining to atomic energy and ionizing radiation, and to report to the Governor thereon.

25506. Any person possessing radioactive materials or machines producing, or capable of producing, radiation shall register this fact with the State Department of Public Health, in accordance with rules and regulations set forth by the Board of Public Health, and on forms prescribed and furnished by the department. Violation of this section will be a misdemeanor. The information obtained by such registration shall be available to all official agencies.

Attachment 2

An act to add Chapter 8 to Division 20 of the Health and Safety Code, relating to atomic energy and ionizing radiation.

CHAPTER 8. ATOMIC ENERGY AND IONIZING RADIATION

25500. The Legislature recognizes that the production and utilization of ionizing radiation, including that from atomic energy applications, for peaceful purposes has already resulted in, and will necessarily continue to result in, conditions calling for changes in the laws

of the State and rules and regulations issued thereunder with respect to, but not limited to, public health and safety, industrial safety, workman's compensation, transportation, public utilities, insurance, conservation of natural resources, including wildlife, protection of streams, rivers, lands, and space from contamination and pollution, agriculture, education, and others, and hereby declares the policy of the State is:

(a) To adapt its laws and regulations so as to encourage the development of beneficial uses of ionizing radiation and nuclear energy while at the same time protecting the public interest and the State's resources.

(b) To have State agencies retain their traditional authorities and responsibilities whenever possible.

(c) That the various departments and agencies of the State which are concerned with radiation and its various applications and use shall develop programs designed to protect the people of the State from unnecessary exposure.

(d) To assure the co-ordination of the programs of the state agencies and the laws, rules and regulations incident thereto, and to insure co-ordination of these activities with the development and regulatory activities of local agencies, other states, and the Government of the United States.

25501. As used in this chapter, the following terms have the meanings described in this section:

(a) "State agency" means every state office, board, commission, authority, department, division and bureau, and is intended to be all-inclusive.

(b) "Atomic energy" means all forms of energy released in the course of nuclear transformation.

(c) "Byproduct material" means any radioactive materials (except special nuclear materials) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear materials.

(d) "Production facility" means (1) any equipment or device capable of the production of special nuclear material in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public; or (2) any important component part especially designed for such equipment or device.

(e) "Special nuclear material" means (1) plutonium and uranium enriched in the isotope 233 or in the isotope 235, and any other material which the Governor declares by order to be special nuclear material after the United States Atomic Energy Commission has determined the material to be such; or (2) any material artificially enriched by any of the foregoing.

(f) "Utilization facility" means (1) any equipment or device, except an atomic weapon, capable of making use of special nuclear materials in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public, or peculiarly adapted for making use of atomic energy in such quantity as to be of significance to the common defense and security, or

in such manner as to affect the health and safety of the public; or (2) any important component part especially designed for such equipment or device.

(g) "Ionizing radiation," or "radiation," as used in this chapter, means any or all of the following forms of ionizing radiation: alpha rays, beta rays, gamma rays, X-rays, neutrons, high-speed electrons, and other atomic particles, but not sound or radio waves, or visible, infrared, or ultraviolet light.

(h) "Radioactive material" means any compound or element which may emit any or all of the following: alpha and beta particles, electrons, protons, neutrons, and gamma and all other emissions which produce ionization directly or indirectly.

25502. (a) There is hereby created in the Office of the Governor, the position of Co-ordinator of Radiation Protection and Atomic Energy Development. The co-ordinator and his staff shall be known as the Office of Atomic Energy Development. The co-ordinator shall be appointed by the Governor and his compensation shall be fixed by the Director of Finance. He shall be a full-time officer and shall serve as adviser to the Governor on the development of atomic energy and radiation protection in the State.

(b) The various departments and agencies of the State which are concerned with radiation and its various applications and use are directed to keep the co-ordinator currently informed as to their activities and programs as they relate to all forms of radiation.

(c) The co-ordinator shall keep current information on the licenses issued by the Atomic Energy Commission in the State and, in turn, transmit such information upon request to any state or local agency. The co-ordinator shall be the point of contact for the AEC with state governments in matters pertaining to atomic energy and ionizing radiation, except for those cases of disaster or extreme emergency covered by other regulations. This is not intended to prohibit such direct communication between agencies as might be required.

(d) The co-ordinator shall establish a system of registration of sources of radiation existing within the State, including promulgation of rules and regulations in accordance with administrative regulations. The co-ordinator may appoint an advisory committee of technically qualified persons, without compensation, to assist in the establishment of the system of registration and the types of sources to be registered.

Information concerning sources shall be made available to all public agencies and the public.

(e) No regulation or amendment to a regulation applying specifically to radiation, which any state agency may propose to adopt, unless it be an emergency, shall be noticed under the provisions of Section 11423 of the Government Code prior to 30 days after it has been transmitted to the Office of Atomic Energy Development.

(f) The co-ordinator shall keep the Governor and the various interested departments and agencies informed of the private and public activities affecting the peacetime uses of radiation, and shall enlist their co-operation in protecting the health, safety and general welfare of the people of the State.

(g) The co-ordinator shall submit a report to the Governor at a reasonable time prior to each general session of the Legislature, recommending such action and/or legislation as he deems desirable.

25503. It is unlawful for any person to manufacture, construct, produce, transfer, acquire, use or possess any special nuclear material, byproduct material, production facility, or utilization factility, or act as an operator of a production or utilization facility wholly within this State unless he shall have first obtained a license or permit for the activity in which he proposes to engage from the United States Atomic Energy Commission if the commission requires a license or permit to be obtained by persons proposing to engage in such activities. Violation of this section is a misdemeanor.

25504. There is hereby created an Advisory Conference on Atomic Energy and Ionizing Radiation, consisting of 15 members, including at least one representative each from industry, labor, medicine, science, education, law, local government, and State Government. The conference shall advise the Governor regarding developments and problems in the uses of atomic energy and ionizing radiation. Members of the conference shall be appointed by the Governor. Of the members first appointed, the Governor shall designate five to serve until October 1, 1960, five to serve until October 1, 1961, and five to serve until October 1, 1962. Thereafter all members shall be appointed for three-year terms, except that members appointed to fill vacancies occurring prior to the expiration of a term shall be appointed for the remainder of such term. The Governor shall annually on October 1st designate one member of the conference to serve as chairman, and the chairman shall call meetings of the conference at least twice each year. The co-ordinator shall serve as the secretary. Conference members shall receive no compensation but shall be entitled to receive their actual and necessary travel and subsistence expenses while serving on business of the conference.

25505. There is hereby created the State Committee on Atomic Energy and Ionizing Radiation which shall consist of the Atomic Energy Co-ordinator as chairman and the heads of the following state departments and agencies, or the individuals designated by the head of such department or agency to represent it: Public Health, Industrial Relations, Water Resources, Natural Resources, Fish and Game, State Water Pollution Control Board, Disaster Office, Attorney General, Agriculture, Education, Finance, University of California, Public Utilities Commission, and such other state departments or agencies as the Governor may indicate. The committee may designate and appoint technical consultants to advise the committee in matters relating to ionizing radiation and atomic energy. The committee shall meet at least every four months to assist in the co-ordination of the program and activities of the respective state departments and agencies in matters pertaining to atomic energy and ionizing radiation, and to report to the Governor thereon.

25506. There is hereby appropriated to the Office of Atomic Energy Development from the General Fund the sum of thirty thousand dollars ($30,000) to carry out the provisions of this act during the 1959-60 Fiscal Year.

Attachment 3

Addition of Article 11 to Chapter 2, Part 1, Division 1 of the Health and Safety Code, 1957.

Article 11. Ionizing Radiation

428. The State Department of Public Health shall conduct and maintain a program of radiologic health, including but not limited to:

a. The conduct of studies to determine the health effects of ionizing radiation.

b. The determination of biologic effects of ionizing radiation on plant and animal life.

c. Registration of all sources of ionizing radiation, including both radioactive materials and radiation-producing machines.

d. The continuous surveillance of air, water, food and other aspects of the environment to ascertain the amount and nature of the exposure of the public and individuals to ionizing radiation.

e. The development of administrative means of control for application in the event of radiation emergencies.

f. Assistance to local agencies in effecting all of the subdivisions of this section.

428.1. The department may enter into agreements with any public or private organization, agency, or individual to carry out its duties and responsibilities with respect to ionizing radiation.

Attachment 4

An act to add Article 3 (commencing at Section 5700) to Chapter 2 of Part 1 of Division 6, and to amend and renumber the heading of Article 3 (commencing at Section 5800) of Chapter 2 of Part 1 of Division 6 of the Fish and Game Code, relating to radioactive material.

The people of the State of California do enact as follows:

SECTION 1. Article 3 (commencing at Section 5700) is added to Chapter 2 of Part 1 of Division 6 of the Fish and Game Code, to read:

Article 3. Radioactive Material

5700. It is unlawful to deposit in, permit to pass into, or place where it can pass into the waters of this State any radioactive substance or material resulting in any concentration in the receiving waters or in the marine and aquatic organisms inhabiting such waters which exceeds the permissible concentrations in water or foodstuffs as set forth in the Federal Register Title 10—Atomic Energy, Part 20—Standards for Protection Against Radiation.

SECTION 2. The heading of Article 3 of said code is amended and renumbered, to read:

Article ~~3~~ 4. Trinity and Klamath River Fish and Game District

APPENDIX V

INDUSTRY SUGGESTIONS AND RECOMMENDATIONS AS TO STATE RADIATION LEGISLATION

GENERAL ELECTRIC COMPANY

Robert C. Thorburn, Consulting Health Physicist for the Atomic Power Equipment Department (June 9, 1958):

The company recommended that radiation protection laws and codes adopted by the State should be as uniform as possible with national agencies to avoid duplication of efforts of existing agencies or regulations. The company recommended the following items specifically.

1. Radiation protection laws, codes, or regulations should be stated in terms of objectives to be attained, leaving details and methods of obtaining the goals to administrative action.
2. State laws should be fitted into the existing governmental structure and operating practices of the State and Federal Government, and should set forth a means by which it will be administered and enforced. * * * It is not such a special problem that special agencies will be required to cope with the potential hazard.
3. Radiation control acts or codes should provide for the registration of potentially hazardous sources and their uses, with some provision for inspection of the sources. Enforcement of radiation standards can be simplified if provisions for registration are included.
4. Laws and codes should avoid making a manufacturer responsible for radiation damage that results from improper use of safe equipment by a customer. Equipment that is not safe should not be allowed.

PACIFIC GAS AND ELECTRIC COMPANY

C. C. Whelchel, Chief Mechanical Engineer (June 9, 1958):

An adequate framework for effective control of radiation hazards from nuclear power plants, as well as from other sources, already exists in present state agencies. * * * It appears to us that there is a need in California for a technical radiological advisory service which can obtain and disseminate the information needed for the establishment of appropriate state regulation of radiation hazards. It also appears to us that some system of registration of radiation materials should be required. Both of these aims can we think be accomplished without setting up a new state agency. An appropriate place for administering the advisory service and the registration requirement would be the State Department of Public Health, inasmuch as decisions relating to radiation hazards involve predominantly medical considerations. * * * Through registration, all regulatory bodies in the State will be able to learn of possible radiation hazards and investigate them. The hazards would be investigated as a matter of course by the tech-

nical personnel in the Department of Public Health. The findings and safety recommendations of the technical personnel would be made available to all enforcement agencies in the State (e.g. the Departments of Agriculture, Industrial Relations, Natural Resources, Public Works, Fish and Game, California Highway Patrol, Water Resources, Public Utilities Commission, State Water Pollution Control Board, Department of Motor Vehicles, Harbor Commissioners, Regional Air Pollution Control Boards, Regional Water Pollution Control Boards, County and City Governments, local Planning and Zoning Commissions, Building Inspectors, local health authorities, etc.).

The enforcement agencies would then make up and enforce with their own personnel whatever requirements they deem necessary in view of the information provided them by the technical personnel in the Department of Public Health.

To eliminate any question of the authority of the Department of Public Health to administer the program of registration and technical assistance, it seems desirable that enabling legislation be passed. This legislation should also make clear that it does not in any way diminish any existing jurisdiction of other regulatory agencies of the State. Thus an agency with a great need for constant technical assistance in radiation hazards, such as would seem to be the case with the Division of Industrial Safety, would be free to employ radiological experts of its own on a full-time basis as the need developed. As we visualize it, this pattern of regulation would be in conformity with that already established in California and this would make for easy, flexible growth in the regulation of radiation hazards, as the need appeared, in the same fashion as regulation generally has been developed in California.

STANDARD OIL COMPANY OF CALIFORNIA, CALIFORNIA RESEARCH CORPORATION

Dr. Donald E. Hull (June 9, 1958):

Occupational hazards from industrial uses of isotopes are adequately controlled by the State Industrial Safety Division's Orders on Radioactivity and Ionizing Radiation. But the company believes it would be in the public interest for the Department of Public Health to adopt regulations setting maximum limits on radioactivity in air and water in the public environment, based on the recommendations of the National Committee on Radiation Protection. Our own operations have always been conducted strictly within these limits, and we believe that many valuable uses of isotopes can be developed within these boundaries.

CALIFORNIA MANUFACTURERS' ASSOCIATION

T. F. Knight, Jr. (June 9, 1958):

1. A regulatory agency, if created, should be separate and apart from existing state agencies. It should not be a part of the Department of Public Health nor a part of the Department of Industrial Welfare, but should be a separate Radiation Safety Commission composed of five qualified experts.
2. The commission should have veto power over all other state agencies' rules and regulations. If a rule or regulation proposed by a

state agency is not approved by the commission, it should not go into effect.

3. There is no need for additional capital outlay for laboratory facilities. The State should use those facilities it presently has and contract with existing private laboratories as needed.
4. The least amount of regulatory control should be the starting point.

LOCKHEED AIRCRAFT CORPORATION, MISSILE SYSTEMS DIVISION

H. J. Stone, Safety Co-ordinator (June 10, 1958, and October 27, 1958):

The goals of legislation should be simplification, co-ordination and uniform application. To meet the goals the following recommendations were made.

(Although) various agencies have jurisdiction in the field of radiation protection, we do *not* necessarily mean that they can supply complete coverage * * * what we *are* saying is that responsibility and authority for covering radiation work seems to exist within the present administrative framework. Thus radiation exposure can apparently be controlled by existing state agencies, with an increase in staffing if it is found to be necessary.

Legislation should encourage co-operation among all regulatory agencies, assign jurisdictions for state agencies, and simplify and unify the regulations. Any legislation proposed should be as simple, objective, and flexible as possible, setting up the goals to be attained rather than the detailed specifications for performance. The administrative codes of the organizations specified in the act should be sufficient to take care of these details.

A technical advisory board on radiation control would offer definite advantages. Having no operational responsibilities, it could prepare and keep up to date those portions of administrative codes relating to radiation, prepare standards for selection of professional and inspectional personnel, and make sure that the various codes provided for co-ordination and co-operation among the regulatory agencies.

Any inspection program must have competent personnel as inspectors. Failing this, we can easily defeat our purposes by lax or over zealous enforcement of regulations. An extreme example of this would be the folly of trying to apply radiation dose limits and other restrictions applicable in industry to a physician administering radiation therapy.

We have heard some comment that a radiation protection agency should be set up in the state having exclusive jurisdiction over radiation work. The operational functions of such an agency are already within the functions and responsibilities of existing state organizations. Also we now have administrative codes, procedures, and lines of communication in use which have stood the test of time. Any reorganization of functions would be likely to cause a transition period in which confusion would reign as responsibilities and jurisdictions were changed, codes were revised, new lines of communication were established, and personnel became familiar with their jobs. * * * Instead of splitting off radiation control responsibilities from all these agencies and setting up

another agency with duplication of many functions, it would seem to be easier to have an adequate number of competent personnel in these agencies to fully carry out the functions in their areas of responsibility. Unless there was promise of a significant improvement of radiation control more simply, uniformly, and economically than by using existing agencies, establishing a new agency would not seem to benefit either the state or the radiation user. Laboratory analytical services are needed to support any radiation control program. A study should be made to determine whether or not the state could contract some of this work out to existing private laboratories or whether it would be more economical in the long run to establish a state laboratory.

The use of radiation and radioactive materials does offer some problems in the protection of personnel and property but we do not think they are unsurmountable. We feel they could be handled by existing state agencies, though this might require the use of additional competent personnel and commercial services where necessary.

The goal should be the elimination of all unnecessary exposure to radiation and this should be made clear in the code. "Permissible" limits should be regarded as "upper" limits.

TRACERLAB, INC.

Loren J. Beaufait, Chief, Radiochemistry Division (June 10, 1958):

There should be assigned to one specific group the responsibility for co-ordinating all matters pertaining to the control and regulation of radiation and radioactive materials within the state. * * * The background of technical information which must be understood and the relatively sophisticated and expensive measurement techniques which must be employed in assessing the hazards from a particular situation are such that it would be prohibitive for a number of groups each to provide themselves with the necessary trained manpower and costly equipment to deal adequately with their particular interests in any given problem. * * * A coordinated effort by one central group wtih appropriate advisory support would deal more directly and quickly with the mushrooming problems of the radiation era and at the same time could keep the various other interested groups appraised in detail so that they would be enabled to discharge the obligations in their special field.

Preventive measures require the enactment of sound regulations and dissemination of these regulations to all groups involved in the use of radioactivity or radiation machines. (A sound basis for these regulations are those regulations now used by the AEC and recommended by the NCRP.) Provision must be made for the intelligent and adequate policing of these regulations to insure that organizations comply.

It is mandatory for state and local groups to have sufficient data in an understandable form on the amount of radioactive fallout. * * * It may require several years of careful evaluations of thousands of samples from every part of the California environment to prepare the needed foundation of information. * * * It

may be unnecessary for the State to set up its own laboratory if adequate services and facilities are available professionally. The State could perhaps accelerate its own program by making use of these services at least on an interim basis.

One of the important responsibilities of the group selected to co-ordinate the state radioactivity program should be that of disseminating information to the public on the benefits of atomic industry and the true facts of the hazards of any particular situation.

GENERAL DYNAMICS, GENERAL ATOMIC DIVISION

William H. Ray, Health Physicist (October 27, 1958):

The Atomic Energy Commission program containing regulations to assure radiological safety of all AEC licensees is, we feel, a very thorough and effective one. Much in it could well be copied. As licensees of the Commission, we find that we can live with this type of an operation and those in a state who do operate under such licenses would perhaps not find a great deal additional benefit from additional state legislation. There would be a problem of duplication if there were conflicts in regulations issued by the AEC and those which might be issued by other agencies.

There is a realm however which perhaps includes even more radiation sources (than those licensed by the AEC), e.g., the realm of radiation-producing machines and radium, X-rays, and many other things in modern technology which deserve attention.

What is needed is unified effective administration without overlapping responsibility. * * * I believe the feeling of industry would be to want a minimum of agencies to have to account to and a maximum amount of unification in whatever program is established.

ISOTOPES SPECIALTIES COMPANY

R. N. Donelson (October 27, 1958):

As a licensee of the Atomic Energy Commission, we operate under its regulations. At the present time, we see no way in which these are inadequate. However it seems somewhat dubious that the Federal Government can continue to keep abreast of the expanding use of these materials.

Any legislation which might be enacted by the State should be flexible and as simple as possible. It should be an consistent as possible with the federal legislation and with other state legislation if this is at all practicable. It should not be made overly restrictive. Enforcement of any legislation is the prime requisite. Poor enforcement would be worse than no regulations.

The question of a single agency or duplication of efforts has been raised. From industry's standpoint, again we would much prefer to deal with a single agency. However, there are certainly several agencies in the State which would probably be involved in the enforcement of regulations. We feel quite strongly that there should be a co-ordinating body whether this is the present Governor's Advisory Committee or some other agency that would coordinate the overall activities for the State especially in dealing with federal regulations and in dealing with other states.

APPENDIX VI

PROPOSED PROGRAM OF SURVEILLANCE OF THE ENVIRONMENT WITH RESPECT TO RADIATION

State Department of Public Health
September 1, 1958

ENVIRONMENTAL RADIATION SURVEILLANCE PROGRAM

A. Objective of the Program

1. To detect, measure, record, and evaluate the total radiation exposure to the population of this state.
2. To enable official agencies to take necessary action to protect the population during periods of increased intensity of radiation incident to industrial accidents, radioactive fallout, etc.
3. To provide advice and consultation to agencies, communities and individuals, concerning radiological health problems.
4. To furnish to official agencies certain information for the development of long-range programs to minimize radiation exposure of the population.
5. To continually provide the public with factual information and authoritative interpretation of data concerning radiological health.

B. Agencies Involved in Program

The surveillance program will be statewide, will be a co-operative program of collecting, evaluating, and distributing information, with the information and evaluations being made available to all interested agencies. The agencies will include federal agencies, city and county health departments; and such state agencies as the State Department of Water Resources, Agriculture, Fish and Game, Public Health, Industrial Relations, the Water Pollution Control Boards, the Radiological Division of the State Disaster Office, and others.

C. Interpretation of Radiation Levels

1. Radiation hazards to the population can be either somatic or genetic. Somatic hazard implies a hazard to the physical well-being of the individual exposed to radiation, consisting principally of damaging "internal radiation" secondary to the deposition of radioactive substances in human tissues, such as the deposition of Sr^{90} in bones. Genetic hazard implies a hazard to future generations due to the radiation damage to the reproductive cells, consisting of an increased incidence of harmful mutations in future generations. Generally speaking, genetic hazard arises from "external radiation" in the form of natural background radiation, exposure to industrial or medical X-ray, etc.

2. The time-intensity relationship is important. There has been established by competent agencies a concept of a maximum permissible dose of (MPD) ionizing radiation. This is expressed as a certain dose of radiation in a specified period of time, such as 0.01 roentgenequivalentman (rem) per week or equally as 0.52 rem per year. Generally, for small amounts of radiation in this range, it is immaterial whether the total dose of 0.52 rem is received on one single day during the year, or whether it is received in the form of $\frac{0.52}{365}$ rem doses each day of the year. It is not feasible to anticipate that radiation exposures involving either somatic or genetic hazards can be kept *continuously* below the safe *lifetime* rate of intensity. Radiation exposures inevitably come in short bursts of relatively higher intensity superimposed upon a continuous relatively low uniform background level. Consequently, it is necessary to evaluate exposures in terms of dose over a given period of time. Since most of the environmental media relating to radioactivity, such as rain, snow, growing crops, water runoff, are seasonal, a year is a convenient unit of time to use. The problem then consists of measuring and evaluating the total dose of radiation, both somatic and genetic, to which each important population segment in California is exposed on an annual basis.

3. The concept of "critical organ" arises from the fact that exposure to radiation is seldom uniform throughout the body, and that different organs of the body vary widely in their vulnerability to damage from radiation. It therefore is necessary to determine or estimate separately the dose to the reproductive organs, the bones, the blood, etc., in order to determine the total radiation damage.

4. The normal pattern of cycle of radioactivity in the environment must be considered in any surveillance program. Radioactivity due to the presence of radioactive chemical substances tends to cycle through the environment rather than remain static. This is best visualized by starting the cycle with radioactivity in air (fall out) which is rapidly transferred (through rain) to soil, streams, and ocean. It then proceeds up the food chains on land and sea through plants and animals to man.

5. Frequently, as in the case of fallout, man's exposure to radiation is not to a single isotope but to a mixture of isotopes of widely varying half life. While this presents no obstacle to the measurement of the instantaneous rate of exposure, it prevents the prediction of the dose over a measured time. Consequently, when the instantaneous rate of exposure exceeds the safe long-time rate of exposure of the most hazardous isotope likely to be present, it is necessary to determine the amount of each significant component of the mixture and make the evaluation of hazard by considering the action of each and combining those dosages which apply to the same part of the body, i.e., the dosages to the bone, the blood, the gonads, etc. Obviously the further one goes in this specific type of identification the more

time consuming the laboratory work. Consequently, the most expeditious procedure is to start with gross measurements and proceed to specific measurements only when the gross figures indicate a possible danger.

SURVEILLANCE OF AIR, RAIN AND AMBIENT RADIATION

A. Monitoring of Air and Rain

The routine monitoring of air and rain furnishes early information of the occurrence of a significant amount of radiological fallout, particularly that resulting from the testing of atomic weapons.

The combined data on radioactive levels in air and rain (or snow) permit the making of working estimates of the total amount of activity reaching the soil in areas of food production, as well as in areas of habitation. Although decided fluctuations may occur over short geographic distances as a result of rainfall patterns, usable approximations of total fallout may be achieved by monitoring on a regional basis; that is, for major metropolitan areas, and for extensive agricultural regions such as the Sacramento or San Joaquin valleys.

The purpose of monitoring air and rain is partly to estimate the health effects of direct exposure of the population through inhalation, but particularly to indicate the need for immediate sampling of field crops and water supplies, as well as the measurement of ambient radiation.

It is desirable to locate the sampling stations for the monitoring of air and rain so as to produce data representative individually of the major metropolitan areas and the major food production areas; consequently, monitoring stations will be located in each of the three major metropolitan areas and in each of the major agricultural areas. This will require monitoring stations in Los Angeles, San Francisco Bay area, San Diego, Eureka, Sacramento, Fresno, Bakersfield, Salinas and El Centro.

Air samples will be collected daily or composite samples collected over a period of a few days. Daily catchments of rainfall will be made at each station whenever precipitation occurs. Augmenting the normal sampling program, supplementary collections of rainfall will be made at convenient points throughout the State when this need is indicated by the levels of radioactivity found at the regular stations or by the occurrence of unusually heavy precipitation. Open containers will also be used at each station to collect the total fallout reaching the surface of the earth.

The standard method for collection of air samples will be the high volume filter sampler now used for the collection of particulate material in connection with the statewide air pollution control program. Rain will be collected in standard rain gauges, or in clean, open containers, properly calibrated, and placed so as to collect a representative sample over a 24-hour period without undue influence from buildings or other nearby structures. Surface drainage or runoff from impervious surfaces will not be used for the measurement of radioactivity in rainfall, since such surfaces will have been previously contaminated by dry fallout.

Gross beta and gamma activities will be measured on all samples. When this activity exceeds values usually experienced or when the activity is considered to be high, additional analysis will be made to identify the nature of the radioactive material. These analyses may include an estimation of the age of fission products, alpha activity and identification of specific isotopes.

Table 1 contains an estimate of the proposed measurement program for air and rain.

Table 1

Proposed Measurement Program

Medium	*Locations*	*Samples per month* [1]	*Laboratory analyses*	
			Total radiation	*Specific analyses* [3]
Air				
Daily	LA-SF-SD	90	90	6
2 per week	Sacto-Fresno-Bksf-Salinas-Imperial V., Eureka	50	50	6
Rain				
Each rainfall	(As above)	75 [2]	75	20

[1] Samples during any one month. These numbers will vary according to season and occurrence of fallout incidents.
[2] During winter.
[3] Estimated number of samples that might require specific analyses.

B. Monitoring Ambient Radiation

Measurements of ambient radiation are for the purpose of determining the exposure of inhabitants of an area to external beta and gamma radiation. Measurements are made three feet above ground surface, with equipment sensitive to at least .01 milliroentgen per hour.

Normal levels of ambient radiation in California during the past two years approximate from .01 to .02 milliroentgen per hour. An increase to .05 milliroentgen per hour would be considered a threshold of public health concern, if it were to persist for more than a short period of time.

C. Point Source Program

A considerable number of industries and research agencies have in their possession quantities of radioactive material which could become hazardous to the public if dispersed in the air environment. In addition, there is a growing number of licensed power reactors having a capability of potential emission of large quantities of radioactive material to the environment in case of faulty operation or accident. It is customary in such cases, particularly power reactors, for the industry or agency in charge to carry out environmental monitoring routinely, in the vicinity of its operation. Such monitoring usually consists of continuous measurement of liquid or gaseous effluents, and the periodic collection and radiological assay of samples of air, soil, vegetation, etc., in the vicinity.

It is not proposed that the State duplicate such activities, except for the collection of occasional samples to verify the results of measurements of the operating agency. Instead, arrangements will be made for regular receipt by the State of results of measurements made by isotope users and operators of power reactors.

In the future it may be necessary for the State to stipulate by regulation the scope and nature of monitoring to be carried out by such industries and users of radioactive material.

D. Evaluation of Measurement Data

In evaluating results of measurement of radioactivity in air and rain, interpretation will be based upon the recommended permissible levels of radioactivity in air, water and food of the National Committee on Radiation Protection and Measurement. The recommended permissible level for continuous inhalation of unidentified fission products is 1×10^{-9} uc/ml of air.

In the past fallout episodes in California the highest levels measured have been approximately one-twentieth of this value. The dose to humans is determined by the duration of exposure as well as the level of activity. Since occasional high levels of activity can be experienced for short periods without a marked increase in dose there is a need for establishing levels of radioactivity in air which can be used as guides in calling for some type of action to protect the public health. The following table indicates the kinds of levels that might be used, where X is a value yet to be selected.

(a) Monthly
average exceeding (x) times the recommended permissible levels for continuous inhalation.

(b) Weekly
average exceeding (10x) the recommended permissible levels for continuous inhalation.

(c) Daily
average exceeding (35x) the recommended permissible levels for continuous inhalation.

Levels of radioactivity in rainfall can only be appraised from the standpoint of safety by taking into account the method by which human beings may become affected; that is, by contamination of drinking water, food or surfaces.

At the present time, no permissible level for rain, as such, can be stated. When levels of radioactivity in rainfall exceed the standard recommended for drinking water, namely 1×10^{-7} uc/ml, it is necessary to direct attention immediately to exposed field crops and sources of drinking water supply. General guides can be developed for levels of activity in rain, where resulting radioactivity in crops and drinking water will be of immediate concern to the public health.

SURVEILLANCE OF FALLEN SNOW, SURFACE WATERS AND DOMESTIC WATER SUPPLIES

A. Fallen Snow

The determination of radioactivity in fallen snow is subject to a number of factors which make interpretation of the monitoring results complicated. To begin with, the snow pack is composed of successive layers representing different storms. Between storms, the snow pack may diminish both by evaporation, which has the effect of removing the most recently deposited layers, and by melting, which results in the mixing of successive layers. Shrinkage of the snow pack, in addition, will entail

the concentration of dirt and other impurities on the surface. The result of these factors is that radioactivity in surface samples from the snow pack does not diminish in accordance with the decay curve of radioactive components. On the contrary, in a succession of samples from the same snowbank, later samples may actually show a higher exposure level of radioactivity than the original ones.

On the other hand, in the higher altitudes, the snow pack may contain a substantial portion of the total radioactive fallout for a year.

For these reasons, it is imperative to monitor the snow pack, particularly during the months when snowfall occurs. Because of the factors affecting distribution of radioactivity within the snow pack, it is desirable that core samples for the full depth of the snow pack be collected.

The Department of Water Resources maintains a program of gauging of snow pack at approximately fifty stations under contract. It is proposed that monthly samples for radioactivity be collected at each of these stations during the winter months.

B. Surface Waters

Since 1950, semiannual measurements of radioactivity have been made of the principal fresh water streams of the State, at a network of approximately 150 stations. This activity has been carried out under contract by the Department of Water Resources for the State Water Pollution Control Board as part of a comprehensive stream sampling program. Measurements have been made by the Radiological Division of the California Disaster Office.

Inasmuch as this program commenced several years before the first testing of nuclear weapons in this country, the first results reflected natural radioactivity resulting primarily from mineral deposits in the mountains. Samples from the official Stream Sampling Stations in recent years have not shown significant increase in radioactivity resulting from fallout. Consequently, the results of this stream sampling program still represent natural background radioactivity in California waters.

The program, without question, should be continued. Unless results of sampling begin to show significant increase, it should not be necessary to increase the scope of this program.

C. Domestic Water Supplies

Most of California's domestic water supplies come from surface sources. Radioactivity in such water supplies consists of the natural radioactivity in the surface streams, plus radioactivity added by the discharge of sewage or industrial waste effluent to the streams, plus the results of fallout, particularly into open, terminal or distribution reservoirs.

Consequently, domestic water supplies must be monitored on a continuous basis, since it is impossible to forecast levels of radioactivity on the basis of radioactivity in rain, snow, or surface streams.

Furthermore, the recommended permissible level of radioactivity in water, namely, 1×10^{-7} uc/ml, applies only to drinking water itself.

Several of the large metropolitan water companies have facilities for measuring gross beta and gamma activity in their own water supplies. The routine monitoring of the major water supplies in the State, exclusive of the Metropolitan Water District of Southern California, the Los Angeles City Water Department, and the East Bay Municipal Utility District water supply, requires a minimum of 30 monthly source samples throughout the year, greatly augmented at times of high radioactive rainfall; and supplementing the above through a field appraisal of potential public health hazards.

Emergency Action

1. With respect to activity resulting from fallout, the departmental action will be as follows:
   a. If activity is below 10^{-7} uc/ml, no action will be taken.
   b. If activity is between 10^{-7} and 10^{-5} uc/ml, the public may be told that the water may be used for a limited time (up to two months) without unreasonable hazard. Further check will be made for decay rate and for specific nuclides.
   c. If activity is between 10^{-5} and 10^{-3} uc/ml, the department will immediately notify the USPHS. Further checks will then be made to see if the decay rate is typical for fresh mixed fission products in fallout, and, if so, we will follow the procedure described in (b) above.
   d. If activity is in excess of 10^{-3} uc/ml, the department may direct that bottled water or an alternate supply of safe water, if available, be used by the public; and an immediate report will be made to the Civil Defense authorities.
2. The same general policies will be followed on nonfallout conditions.

SURVEILLANCE OF WASTE DISPOSAL

A planned disposal of radioactive wastes is accomplished in two basic ways: by discharge to the public sewers and by burial in the ocean or on land. In addition, radioactive waste disposal problems may be alleviated by storage of waste until levels of radioactivity have decreased through normal decay.

Monitoring through the collection of environmental samples is necessary for radioactive discharge to the sewers and burial in the ocean. Sewage is most economically monitored as it reaches a treatment plant, because in this manner a single sample reflects the loading discharged to the entire sewer system.

Unusually high values encountered in such monitoring point up the need for intensive investigations to discover the sources. It is advisable to monitor not only raw sewage, but also treated sewage effluent and sewage sludge, particularly when these are reused and may be recycled in the food chain. Monitoring of ocean waters in areas where radioactive wastes are buried is for the purpose of discovering improper practices where package wastes are dumped, since, barring mishap or faulty practice, no escape of radioactivity to the ocean waters should occur.

The proposed schedule of monitoring in ocean waters is based on the assumption that all wastes will be packaged, and no bulk solids or liquids will be discharged directly to the ocean waters.

Routine monitoring will involve a sampling schedule as shown in the following Table 2.

Table 2

Surveillance of Water and Wastes

	Samples per month	*Total radiation*	*Specific analyses*
Ground waters [1]	1	1	--
Surface sources [2]	55	55	1
Sewage-industrial wastes [3]	27	27	1
Sludge [3]	15	15	10
Salt waters [4]	2	2	2
Fallen snow and melt	75	75	18
Totals	175	175	32

[1] Does not include needs of Department Water Resources, Water Pollution Boards, etc.
[2] Includes State Stream Sampling Program but not the needs of WPC Boards, Fish and Game, Department Water Resources, etc.
[3] Includes only WPC Board No. 4's Hyperion Monitoring and Department Public Health's needs.
[4] Does not include needs of Department of Fish and Game, WPC Boards, etc.

In addition to collection of samples, surveillance of waste disposal operations will be accomplished by inspection and review of facilities and operations.

The principal characteristics of the proposed waste disposal surveillance program will be as follows:

A. Monitoring

1. Samples of sanitary sewage effluents and sludges will be submitted on a monthly basis by the major sewage works operators. The number may approximate 10 plants or 20 samples per month. Should any effluent sample exceed 10 × MPC, additional samples will be taken and, if still high, an attempt will be made to locate sources of radioactivity and further appraise the hazards of effluent disposal.
2. Review of waste monitoring data being collected by reactor operators, waste disposal companies and isotope users will be made periodically. Occasional check samples will be run; these may be on the order of two analyses per month.
3. Special surveys and sampling for local agencies will be carried out on request if feasible.

B. Inspection and Review of Facilities and Operations

1. Periodic inspections will be made of facilities and operators which handle or could produce appreciable quantities of radioactive wastes, except medical isotope use by individual physicians, and sealed sources. The term "appreciable quantities" is difficult to define because of the variation in hazard potential, isotope, and qualification of use. An estimated 10 samples per month will be analyzed.
2. Develop through liaison with AEC, industry et al., an opportunity to participate in site selection in the absence of a state licensing or permit procedure.
3. Evaluate the public health hazards of any proposal to dispose of wastes or to use isotopes as tracers whereby such tracers are deliberately introduced into the environment and reach the waters of the State, directly or indirectly.

SURVEILLANCE OF FOOD

Surveillance of the food supply is based upon the concept of the cycling of radioactivity through the food chain in one of several ways.

Probably the principal manner is the transfer of radioactivity from the soil into growing plants, thence into animal products, and finally to man.

A second, and shorter route is the direct contamination of growing field crops by radioactive rain.

A third route is the development of low levels of radioactivity in ocean water which would be entirely insignificant to humans were it not for the fact that plankton and other marine organisms are capable of reconcentration of radioactive isotopes many thousandfold. It is believed that with respect to the food chain on land, it should be possible to establish reliable relationships between the concentration of significant isotopes (such as Strontium 90) in soil, in plants, in animals and in man, which would enable monitoring to be accomplished by measurement of radioactivity in only one of these links in the food chain.

With this in mind, it is proposed that for the first few years, all elements in the food chain be monitored so that this relationship may be established.

Monitoring of food on land has been planned on a regular basis with measurements being made in each of the following five food raising areas:

1. Sacramento Valley
2. Delta Area
3. San Joaquin Valley
4. Salinas Valley
5. Imperial Valley

In each of these locations, samples will be collected systematically of soil, representative fruit and vegetable crops, beef, milk, and bone.

With respect to the ocean food chain, systematic sampling will be carried out in two locations of the State on ocean water shellfish and skeletal fish.

In planning the frequency of sampling, account will be taken of the fact that radioactivity in soil changes very slowly and that a soil sample gives an integrated value representing several years of exposure; while a food commodity, like milk, gives an integrated value over a period of several weeks.

The proposed sampling schedule is as outlined in Table 3.

TABLE 3
SURVEILLANCE OF FOOD
Sampling Schedule

Commodity	*Sampling Schedule*	*Samples per year* *Total radiation*	*Specific analysis* *
Representative leafy vegetables	Once/crop	120	120
Representative root plants	Once/crop	120	120
Processed fruits and vegetables	5 products	120	120
Fresh milk	Monthly	48	48
Condensed milk	Twice/yr.	8	8
Dried milk	Twice/yr.	8	8
Beef (domestic)	Twice/yr.	12	12
Beef (imported)	Twice/yr.	12	12
Animal bone	Once/yr.	12	12
Poultry	Twice/yr.	12	12
Eggs	Twice/yr.	12	12
Sardines	Twice/yr.	12	12
Tuna	Twice/yr.	12	12
Shellfish		24	80

* Specific analyses may be limited to the determination of Potassium 40, may include only Strontium 90, or more complete isotopic analysis.

SURVEILLANCE OF MEDICAL, INDUSTRIAL, AND COMMERCIAL USES OF RADIATION

A. The medical and allied professions contribute a substantial portion of the total radiation to the population in the form of x-ray, fluoroscopy, and the use of radioactive isotopes. The general industrial safety orders of the State Division of Industrial Safety deal with the protection of employees exposed to potentially dangerous levels of radiation. These orders are occupational in character, and permit an occupational maximum permissible dose of radiation which is 10 x the maximum dose permitted to the population as a whole. These orders extend to the protection of the public only incidentally. There is now almost complete agreement that the same kind of protective action should be extended to patients and to casuals. Generally, there is no regulation elsewhere of the medical and allied professional use of radiation for diagnostic or therapeutic purposes, except for the federal regulations applying to licensees of the Atomic Energy Commission in the uses of radioactive materials. Surveillance of radiation activities relating to the medical and allied professions is a proper concern not only of public health agencies, but also the professional societies and the individual prescribers and users of radiation, as all are equally obligated to guard the public against any unnecessary exposure. Controls must not limit the intentional exposure of patients to radiation for the purpose of diagnosis, therapy, or research as authorized by law. However, radiation in the above instances should be used only where clinically indicated and with proper and expert supervision and operating conditions. The benefits must continually be evaluated in terms of the hazards involved. Controls relating to these uses of radiation must be broad in scope, with provision for revision as required. The success of any control program relating to medical uses will depend almost entirely on the active support, co-operative effort, and self-discipline of the entire medical and allied professions of the State.

B. The industrial and commercial uses of radiation in California have progressed to such an extent that this State is now one of the primary areas of nuclear development. In order to encourage continued and optimum progress in the future, the State must initiate action to develop the necessary regulatory framework, standards and controls. This must be supported by an effective program of public information and education to insure effective and co-operative effort based on a realistic appraisal not only of the potential hazards but also the great social and economic benefits of atomic energy.

C. A radiation surveillance program can be evaluated only on the basis of thorough understanding and appreciation of the many facets of radiation. The more important of these are the concept of somatic hazard to the individual as compared to the genetic hazard to the population as a whole; the concept of a natural background radiation as compared to the added radiation from man-made sources and procedures; and the obvious benefits of radiation to mankind in the form of medical uses, research and atomic energy as compared to the hazards.

D. Surveillance activities relating to medical, industrial, and commercial uses include the following:

1. Registration of sources of radiation
   (with exceptions based on nature of materials and magnitude of activity)
   a. Information concerning location, nature, magnitude, form, use.
   b. Freedom of access to further information.
   c. Notice of accident or unusual occurrence.
2. Development of standards of machines, facilities, and installations, with provision for inspection.
3. Development of standards of good operating practice, with provision for inspection.
4. Measurement and assessment of the total population exposure.

PROPOSED LABORATORY FOR RADIOLOGICAL SURVEILLANCE PROGRAM

The foundation of a sound program of evaluating radiological hazards in the environment is an adequate laboratory. It is believed that a single laboratory closely associated both with the sampling program and with the interpretation of analytical results can most efficiently and economically serve the needs of the program. The following evaluation of laboratory requirements is predicated on one such laboratory.

A. Sampling Program

Type of sample	Laboratory analyses/month: Gross beta-gamma measurement	Specific analyses*
Air	140	12
Rain	75	18
Snow	75	18
Water, fresh	56	1
Water, saline	2	2
Sewage and industrial wastes	27	1
Sewage sludge	15	10
Food, plants	30	30
Food, milk	6	6
Food, meat	2	2
Food, bone	1	1
Food, fish	2	2
Food, shellfish	2	4
Food, poultry and eggs	2	2
Soil	1	1
Totals	436	110

* Specific analyses may vary from relatively simple decay measurements to complex, time-consuming isotopic analyses.

B. Cross Beta-Gamma Measurement

Sample Type	No./month	Man-hours per sample	Total man-hours per month	Instrument-hours per sample	Total instrument-hours per month
Air	140	0.3	42	0.7	98
Rain, snow, fresh water	206	0.5	97	0.7	135
Sewage	27	1.0	27	0.7	19
Sewage sludge, food, soil, salt water	63	1.3	82	0.7	44
Totals	436		248		296

C. Specific Analysis

On all samples for which specific analyses are indicated, the rate of decay shall be measured. If additional analyses, especially isotopic analyses, are required, it is impossible to predict accurately the time requirements. On the basis of past experience it seems reasonable to assume an average of 12 man-hours per sample for specific analyses exclusive of decay measurements.*

1. Decay measurements:

   The man-hours and instrument-hours are the same for all samples, respectively, 0.5 and 2.7. Thus, for 110 samples, a total of 55 man-hours and 297 instrument-hours are required.

2. Isotopic analysis:

   As indicated above, 12 man-hours per sample may be used as an average (but probably minimum) value. Thus, for 110 samples, 1,320 man-hours are required.

D. Personnel Requirements

1. Gross counting and decay:

   Three hundred and three (303) man-hours or 1.8 men. It is suggested that an electronics technician and a chemist with an

* Of necessity, the relative newness of the field will require some time to be devoted to methods development. An allowance for this time is included in the 12 man-hour per sample figure. An allowance for time lost due to vacations and holidays is likewise included.

electronics background be used. Since two people are suggested, there will be adequate time allowed for equipment maintenance and repair (as well as actual sample counting) by the electronics technician. The electronics technician will also service all other laboratory and field equipment.

2. Isotopic analysis:
   1,320 man-hours (minimum) or 7.8 men (minimum). It is suggested that six public health chemists and two laboratory assistants be used.
3. Calibration and maintenance of field equipment:
   It is suggested that one chemist, with the part-time assistance of the electronics technician, will be able to handle this.
4. Clerical:
   One clerk to handle routine office procedures; one clerk to handle data produced by the laboratory.

E. Equipment Requirements

1. All gross beta-gamma measurements, including decay, on unseparated isotopes shall be made with a proportional gas flow counter. A single automatic sample changer counting assembly together with three manual gas flow counters will be minimal for these measurements (the down time on this equipment was taken to be 25%).
2. Measurement of separated isotopes may be made with a scintillation detector (gamma sensitive) or with a Geiger-Muller counter. Both types of counting equipment are needed. A Geiger-Muller counter will be especially valuable in making absorption studies.
3. Measurement of unknown mixtures of isotopes for which rapid evaluation is desired can be facilitated by the use of a gamma ray spectrometer. This would be especially valuable in dealing with atomic accidents. It is suggested that for the present a single channel spectrometer is needed. Future needs may, however, dictate use of a multichannel (100 or more) spectrometer.
4. Accessory laboratory equipment must include: fume hood, large capacity balance, analytical balance (preferably single pan), large capacity muffle furnace, one or more centrifuges, oscilloscope, pulse generator, vacuum tube voltmeter, tube tester, spare tubes, tools, etc.

F. Training

An adequate training program must be established to:

1. Provide chemists with specific knowledge in the field of radioactivity and its measurement, and
2. Provide chemists with specific knowledge of radiochemical techniques.

G. Space Requirements

It is roughly estimated that adequate hood and bench space will require about 3500 sq. ft. of floor space for the personnel and equipment noted above.

APPENDIX VII

WITNESSES TESTIFYING BEFORE THE SUBCOMMITTEE ON AIR POLLUTION AND RADIATION PROTECTION

(Public Hearings: February 25, June 9 and 10, October 27, 1958)

ATOMIC ENERGY COMMISSION
Robert Lowenstein, Office of the General Counsel, Washington
G. W. Morgan, Division of Licensing and Regulation, Washington
R. W. Smith, Director of Inspection, San Francisco

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
R. W. Hart, Regional Engineer

STATE DEPARTMENT OF PUBLIC HEALTH
Dr. Malcolm Merrill, Director
Frederic M. Kriete, M.D., Deputy Director
Robert Dyar, M.D., Chief, Division of Industrial Safety
William H. Clark, M.D., Division of Preventive Medical Services

STATE DEPARTMENT OF INDUSTRIAL RELATIONS
Edward P. Park, Director
A. C. Blackman, Chief, Division of Industrial Safety

CALIFORNIA DISASTER OFFICE
Charles T. Rainey, Chief, Division of Radiological Safety

STATE DEPARTMENT OF AGRICULTURE
Charles V. Dick, Assistant Director

STATE DEPARTMENT OF FISH AND GAME
Phil M. Roedel
William E. Ripley

STATE DEPARTMENT OF NATURAL RESOURCES
Bennie Troxel, Division of Mines

CALIFORNIA PUBLIC UTILITIES COMMISSION
John J. Doran, Jr., Electrical Engineer

STATE DEPARTMENT OF PUBLIC WORKS
John Matheny, Division of Highways

STATE DEPARTMENT OF WATER RESOURCES
Meyer Kransky

STATE OF CALIFORNIA, LEGISLATIVE ANALYST
A. Alan Post

STATE DEPARTMENT OF FINANCE
Robert L. Harkness

CITY OF LOS ANGELES
Col. Richard F. Lynch, Director, Office of Civil Defense
Jack C. Rogers, Health Department

COUNTY OF LOS ANGELES
John Vaden, Health Department

LOS ANGELES AIR POLLUTION CONTROL DISTRICT
Adam Wiley, Radiological Co-ordinator

BAY AREA POLLUTION CONTROL DISTRICT
Benjamin Linsky

Honorable Chet Holifield, Congressman from California
Dr. Albert W. Bellamy, Department of Biophysics
University of California at Los Angeles

Dr. John W. Gofman, Professor of Medical Physics
University of California at Berkeley
Dr. Curt Stern, Professor of Genetics
University of California at Berkeley
Dr. Robert R. Newell, Professor Emeritus
Stanford University
John M. Heslep, Chief Radiological Safety Engineer
University of California
Dr. Herbert R. Packard
California State Dental Association
Dr. Harold A. Hill
Pacific Roentgen Society
Dr. Geoffrey A. Fricker
Radiologist
Dr. George Jacobson, Chairman, Department of Radiology, School of Medicine
University of Southern California
Lee H. Norcross, D.C., Executive Secretary
California Chiropractic Association
Robert C. Thorburn, Health Physicist
General Electric Company, San Jose
C. C. Whelchel, Chief Mechanical Engineer
Pacific Gas and Electric Company
Dr. Donald E. Hull, California Research Corporation
Standard Oil Company of California
T. F. Knight, Jr.
California Manufacturers' Association
H. J. Stone, Safety Co-ordinator, Missile Systems Division
Lockheed Aircraft Corporation
William H. Ray, Health Physicist, General Atomic Division
General Dynamics, San Diego
R. N. Donaldson, Isotopes Specialties Company
Burbank
Loren J. Beaufait
Tracerlab, Inc., Richmond
Walter W. Offner
X-ray International, San Francisco
Richard Cartwright, Educational Representative
United Automobile and Aircraft Workers of the U. A. W.
Leo Goodman, Atomic Energy Advisor to the U. A. W.
Mrs. Viola Beeson
Local 1100, A. F. of L.
Stanley E. Brown, Consumers Co-operative of Berkeley, Inc.
Fritz Mangold, Executive Secretary of Sports Council
Southern California Council of Conservations Clubs
Mrs. Effie Schwarzschild
San Francisco
Mrs. Rita Schaffer
Mrs. Ida Hoos
Berkeley
Mrs. L. Kelley Mayhew
James Dunlap

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February, 1959

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LETTER OF TRANSMITTAL

ASSEMBLY CHAMBER, STATE CAPITOL
SACRAMENTO, February 11, 1959

HON. RALPH M. BROWN
Speaker of the Assembly, and
MEMBERS OF THE ASSEMBLY
Assembly Chamber, Sacramento

GENTLEMEN: The Assembly Interim Committee on Public Health submits this report entitled "Development and Control of Nuclear Industry in California" prepared for the Subcommittee on Air Pollution and Radiation Protection by the Bureau of Public Administration, University of California at Berkeley in accordance with House Resolution No. 219, 1957 Session.

Respectfully submitted,

W. BYRON RUMFORD, Chairman
Assembly Interim Committee on Public Health

SUBCOMMITTEE LETTER OF TRANSMITTAL

ASSEMBLY CHAMBER, STATE CAPITOL
SACRAMENTO, February 11, 1959

HON. W. BYRON RUMFORD, *Chairman*
Assembly Interim Committee on Public Health

DEAR MR. RUMFORD: This report on Nuclear Energy Industry Development and Control was prepared at the request of the Subcommittee on Air Pollution and Radiation Protection by the Bureau of Public Administration, University of California. The committee wishes to express its sincere appreciation to Professor Dwight Waldo, acting director of the bureau, and the author, Dr. Frances Herring, for their co-operation in the preparation of this report.

The report presents background information vital for an understanding of the nature and uses of nuclear energy and radiation. It outlines the legislative approaches adopted by other states and federal agencies to cope with the problems posed by this new industry and it discusses various criteria for state legislation and regulation.

The bureau staff and the committee have worked closely in the planning and preparation of this report so that it would supplement the subcommittee report submitted this same date. The author and the Bureau of Public Administration, are, of course, responsible for the data and its emphasis.

Respectfully submitted,

SETH J. JOHNSON, Chairman
Subcommittee on Air Pollution and Radiation Protection
W. S. GRANT
RICHARD T. HANNA
DON MULFORD
W. BYRON RUMFORD

LETTER OF TRANSMITTAL

FROM UNIVERSITY OF CALIFORNIA TO COMMITTEE

University of California
Bureau of Public Administration
February 16, 1959

Assemblyman Byron Rumford, *Chairman*
Assembly Interim Committee on Public Health
Subcommittee on Air Pollution and Radiation Protection
State Capitol, Sacramento, California

Dear Assemblyman Rumford:

In response to your request for a study of nuclear industry in the state and nation, to serve as background to the deliberations of your committee, I am submitting herewith our report, entitled: "Development and Control of Nuclear Industry in California."

This study briefly explains the nature of nuclear energy; then it describes the kind of nuclear industry which has sprung up over the Nation since 1954; concentrates on the situation in California; notes the governmental agencies—federal, state, and local—which have concern in nuclear-energy programs; describes the legislative and statutory action of other states; presents an index and discussion of outstanding problems raised by the advent of nuclear industry; and concludes with general criteria and specific proposals for legislation which have been developed by students of the field.

The Bureau of Public Administration wishes to express its appreciation for the fine co-operation extended by Diana Clarkson of your staff and, indeed, by your whole committee; and to acknowledge the assistance of many persons in and out of government, across the Country, who have provided information about their activities and experiences. We also wish publicly to thank the many men and women in California who have given valuable time in interviews, and the numerous critics who have read early versions of the study and made helpful suggestions. Mr. Stanley Scott of the Bureau of Public Administration staff guided the study at its crucial turns and served in an overall advisory capacity.

It is our sincere hope that the information presented will be of some assistance to your committee members and other legislators, in their consideration of measures to co-ordinate regulation and promotion of nuclear industry in this State.

Sincerely yours,
Dwight Waldo
Acting Director

DEVELOPMENT AND CONTROL OF NUCLEAR INDUSTRY IN CALIFORNIA

INTRODUCTION

In the nearly five years since the Atomic Energy Act of 1954 relaxed federal monopoly and control over the field, nuclear research and industry under private auspices has flowed like a swelling tide over the whole country, bearing upon its surface a tangled web of problems which must be promptly dealt with if nuclear energy is not to be a bane rather than a blessing to man.

Since 1955, the state legislatures have considered many bills, aimed either at protecting the people of the state from harmful effects of nuclear radiation, or at encouraging nuclear energy industries to locate in the state under conditions consistent with public health and safety, or combining both aims. Four atomic energy bills were proposed to the California Legislature in 1957; and in the 1958 sessions approximately 250 such bills came before the state legislatures, less than a half dozen of which became law.

Faced with the bewildering complex of technical, physical, economic, and social problems posed by the peaceful uses of atomic energy, the first concern has properly been to institute new types of protection of workers and the public against the harmful effects of atomic radiation; and this is still the first problem in urgency. Another response of the states has been to establish study committees to survey and organize the field, and advisory groups to inform and counsel the governors. California has had a Governor's Advisory Committee on Peacetime Use of Radiological Materials since 1956. But emphasis is growing upon the part state governments may play in developing and encouraging as well as in regulating atomic energy industry. A number of interstate associations have been formed to secure the benefits of co-ordinated action in bringing atomic energy industry to their areas. The governors of six New England states set up a New England Committee on Atomic Energy as early as 1954; and 15 southern states, after co-operating for over a year in nuclear research and development, last year approved a plan to create a regional nuclear energy compact, requiring ratification by the state legislatures and Congress, to advise member states on expansion and regulation in the nuclear field.

The year 1958, according to a report from the Atomic Industrial Forum, chief spokesman for atomic energy industry, saw the following state activities in this field:

> * * * Kentucky established an office of nuclear information with a director serving as state co-ordinator of atomic energy, bringing the total number of states having an individual assigned the task of co-ordinating atomic energy at the state level to 12 (Arkansas, Connecticut, Florida, Georgia, Kentucky, Maine, Mas-

sachusetts, New Hampshire, Ohio, Rhode Island, Tennessee, and Washington).

Two states, Michigan and Minnesota, adopted radiation codes in addition to the following six states which had previously adopted codes: California, Connecticut, Massachusetts, New York (with two state-level codes), Pennsylvania and Texas. The City of New York adopted a comprehensive radiation ordinance.

At year's end, 16 states required registration of radiation sources either as a result of code requirements or as a result of statutory legislation (Alaska, Colorado, Connecticut, Delaware, Illinois, Kansas, Massachusetts, Michigan, Minnesota, New Jersey, New York, North Dakota, Pennsylvania, South Dakota, Texas, and Wyoming).

During the year six states (Kentucky, Mississippi, North Carolina, Oklahoma, Oregon, and Washington) established study groups or commissions serving as advisory committees to the governor, the legislature, or a state agency on atomic energy or radiation controls, bringing to 30 the total number of states to have done so.

In 1958, the Southern Governors' Conference adopted a resolution initiating action on an atomic energy interstate compact in the South and continuing the Regional Advisory Council on Nuclear Energy.[1]

By now, several study and advisory groups have issued impressive reports and recommendations,[2] and enough experience has been gained to be of aid in designing more comprehensive legislation. It is clear that there is need for some degree of uniformity of state action, since many firms have branches in several states, workers move from state to state, and wind and water carry the effects of accidental releases of nuclear energy across political boundaries. On the other hand, each state's problems are in some respects unique. In the hope of increasing the uniformity and adequacy of state laws and regulations, while permitting the flexibility needed to fit the act to each state's conditions, the New England Committee on Atomic Energy, the Council of State Governments, the National Committee for Radiation Protection, the American Public Health Association, the University of Michigan Law School, and other national and international groups have prepared drafts of model acts. California's 1957 Chapel Bill followed the pattern prepared by the New England Committee and endorsed by the Council of State Governments

[1] Atomic Industrial Forum, Inc., *News Release* (December 24, 1958).

[2] A partial list of these includes: Texas. Legislative Council, *Implications of Atomic Energy for Texas* (May, 1955); New England Committee on Atomic Energy, *Atomic Energy and New England* (July, 1955); New York State. Department of Commerce and Rensselaer Polytechnic Institute, *Atomic Energy for New York State* (April 4, 1956); Illinois. Legislative Council, *State Action with Regard to Atomic Energy* (July, 1956); Ohio. Conference on Peacetime Uses of Nuclear Energy and Radiation Safety, *Proceedings* (August 29, 1956); Illinois. Atomic Power Investigating Commission, *Report* (March 1, 1957); Iowa. State University. Institute of Public Affairs, *State Control and Administration of Atomic Radiation* (1957); Virginia. Advisory Legislative Council, *State Regulation of the Uses of Atomic Energy; Report* (November 14, 1957); Massachusetts. Department of Public Health, *Report on Regulatory and Protective Measures Pertaining to Radioactive Materials* (December 30, 1958); Massachusetts. Special Commission Established to Make an Investigation and Study Relative to the Establishment of an Atomic Energy Industrial Research Center, *Special Report* (December 30, 1958); Minnesota. Minnesota Atomic Development Problems Committee, *Basic Data Regarding Atomic Development Problems in Minnesota* (1958); and New York State. Advisory Committee on Atomic Energy, *Recommendations as to Necessity for State Legislation with Respect to Atomic Energy* (1959).

—the earliest model to be suggested. However, experience shows that adoption of this pattern has not resulted in similar action within the states. The act is little more than a framework within which very different purposes may be accomplished.

California leads all the states so far as the location and manufacture of nuclear reactors is concerned, and its use of radioisotopes accounts for about 10 percent of the national total of byproduct materials. As of November 30, 1958, of 4,424 shipments of radioactive isotopes by the United States Atomic Energy Commission, 422 were to users in this State.

Since 1955, the California Department of Industrial Relations has had a comprehensive regulation covering employees exposed to ionizing radiations or radioactive materials; and in the same year a chapter was added to the State Health and Safety Code, permitting the State Department of Public Health to prohibit dangerous disposal of radioactive wastes.

During 1957-58 the Assembly Interim Committee on Public Health, Subcommittee on Air Pollution and Radiation Protection, has held a series of public hearings and conducted other investigations into the status of radiation protection and control in California, for report to the Legislature. The need for supplementary research, presenting a comprehensive picture of important historical, national and nonhealth aspects of the question has prompted the writing of this companion study. It is intended to serve as a background to the interim committee's report.

The present study, directed to the California Legislature and California citizens, has the following purposes:

To present the basic concepts of nuclear physics and nuclear engineering which an informed citizen now needs as part of his working body of knowledge of today's world;

To describe nuclear industries and the common uses of nuclear energy in research, medicine and agriculture, giving a picture of the geographical concentrations of nuclear industry in the U. S., with some indication of the individual firms and other institutions involved;

To describe the nature, extent, location, and economics of nuclear energy use in California;

To list and describe the interests and powers of federal departments and agencies in this field, the international agencies at work, and the units of local government whose traditional responsibilities are affected;

To describe what other states have done and are doing in the way of atomic energy legislation, regulation, development, and education;

To discuss the chief types of problems—biological, economic, and psychological—raised for states and individuals by the growth of the use of nuclear energy; and

To present criteria for state legislation and regulation gleaned from suggestions made by informed students of these problems.

CHAPTER I [1]

BACKGROUND INFORMATION

While a grasp of the nature of atoms, their composition, structure and ways of behaving, is not essential to a grasp of their practical impact on government, atomic processes are fascinating and not too complicated to be understood in broad outline by the average layman; while it is certain that some knowledge of the basic principles of nuclear physics is a requisite for understanding the technology of nuclear industry and how to cope with the hazards it creates. This chapter tries to show that nuclear processes lose their mystery when every term of the technical jargon is explained and when new information is linked with what the average person already knows about chemical and other more familiar phenomena. The reader who is already informed, or who prefers to plunge at once into the descriptive parts of this study, is invited to skip this chapter.

The invention of the nuclear reactor and the existence of the many industries based upon the effects of reactors was made possible by the discovery that matter can be converted into energy. The story of this discovery takes us back only about 60 years in point of time; for it was in 1896 that Henri Becquerel, and soon thereafter Pierre and Marie Curie, E. Rutherford and others, first observed the phenomenon of radioactivity which has played a leading role in letting us come to understand the structure of the atom and in furnishing proof of the truth of Einstein's assertion that mass and energy are "equivalent."

As early as 1905 Einstein stated, both on mathematical and physical grounds, his mass-energy equivalence principle, and suggested that an experimental proof of this might be found in a study of the radioactive substances which had been encountered so recently by experimental physicists and were so little understood.

For 25 years the suggestion remained for the most part in the realm of theory; but beginning about 1930 direct experimental confirmation began to increase; and we now have ample evidence for holding that matter can be converted into energy, and energy into matter.

The description and explanation of how this occurs is the concern of nuclear physicists. Our interest in the matter is due to the fact that in splitting an atom of uranium into fragments (producing fission) enormous amounts of energy are produced—that is, the disruption of a very

[1] This chapter has closely followed, and drawn heavily upon, H. D. Smyth, *A General Account of the Development of Methods of Using Atomic Energy for Military Purposes Under the Auspices of the United States Government, 1940-1945* (1945), Ch. I, II, and Appendices. Other sources to which the chapter is indebted are: Peter Alexander, *Atomic Radiation and Life* (1957); Gerald Wendt, *The Prospects of Nuclear Power and Technology* (1957); and Mary S. Goldring, *Economics of Atomic Energy* (1957).

Material has also been incorporated from instructive conversations on nuclear physics and nuclear engineering with Dr. Leonard Pockman, physicist, of Palo Alto—who, however, is not responsible for any crudities which may appear.

Reynold F. Brown, M.D., of the Radiation Safety Division, University of California Medical Center, was kind enough to read the chapter in an earlier version and to make many useful suggestions.

small quantity of matter can produce a very large quantity of energy; and the story of how to start such a fission and how to control it is of direct interest to students of nuclear industry.

WHAT IS RADIOACTIVITY?

Radioactivity is the process of giving off, or emitting, radiations.

A radioactive material is one which has this capacity or property.

But what is radiation?

As used in discussions of atomic energy, the word "radiation" is used for any of the several means by which energy is transmitted from radioactive materials to other materials.

There are three types of radiation given off by radioactive sugstances—*alpha particles, beta particles,* and *gamma rays.* Two of them, as their names indicate, are particles of matter, the third a form of energy similar to X-rays. This means that two of them behave in certain respects as bullets or billiard balls do, while the third behaves as light, radio signals, or radiant heat does. But gamma rays behave very much more like particles than do forms of energy which have longer wavelengths, for gamma rays are given off in little discrete units or packets called *quanta* (singular, *quantum*).[2]

Before we can explain radioactivity further, we must introduce some current ideas about how atoms are structured—ideas based partly on the study of radioactivity.

ATOMS

Contrary to what we were taught not so very long ago, the atom is not the ultimately simple building block of matter, but is itself a structured system of particles which vibrate and move unceasingly within the relatively empty space inside the atom. We now believe that there are three fundamental particles out of which all elements are made—the *proton,* the *electron,* and the *neutron*—usually found in the stable structure called the atom, but capable, under certain circumstances, of being broken apart from the atom and existing for a time outside of any structured system.[3]

The atom's core consists of a complex and heavy mass, the *nucleus,* which accounts for more than 99.9 percent of the atom's total weight. The parts of the nucleus are so tightly bound together that it requires enormous energies to break them apart. Until Rutherfords' work in 1919, scientists had not been able to accomplish this.

The nucleus is surrounded by a largely empty region, in which a number of lighter-weight particles, the *electrons,* revolve in concentric orbits (usually called "shells") much as the planets revolve about the sun.

The nucleus contains two types of particles, *protons* and *neutrons.* Each proton carries a positive electric charge,[4] and each electron carries a negative charge of the same size. The number of electrons circulating about the nucleus is equal to the number of positive charges in

[2] And electrons behave something like wave phenomena, i.e., they diffract like beams of light, and an electron traveling at a certain speed has associated with it a certain wave length.

[3] The alpha particle, which we have mentioned, is an important *complex* particle, consisting of two protons and two neutrons.

[4] The unit of electric charge used in nuclear science is the one found to be carried by every proton—the positive charge of the proton.

the nucleus, so that the atom as a whole is electrically neutral, the negative charges of the electrons neutralizing the positive charges of the protons.

The number of positive charges in the nucleus is called the *atomic number*. It determines the number of electrons. These, as we have said, arrange themselves in successive orbits about the nucleus, which are called the *first shell*, *second shell*, and so on, to the *outermost shell*. Physicists have discovered that two electrons is the maximum number of electrons the first or innermost shell will accommodate; the second shell can accommodate up to eight electrons, and some shells can accommodate as many as 32 electrons. Various properties are associated with disturbances of the electrons in these various shells. Characteristic X-rays arise from disturbances of the electrons close to the nucleus; optical spectra arise from disturbances of the outer parts of the electron structure; and the chemical behavior of an atom—what other atoms it will unite with, and so on—depends on disturbances of the outermost electrons. The formation of chemical compounds, in fact, involves minor rearrangements of the electrons in the outermost shells of the combining atoms.[5] Some arrangements of electrons about the nucleus are more stable than others, and atoms whose internal structure is most stable are chemically most inactive.

Now atoms which are chemically most stable have eight electrons in their outermost shell,[6] and atoms *not* in this state will exchange or share electrons with other kinds of atoms until they reach this stable octet structure, i.e., they will be chemically active. Six elements in nature, the so-called inert gases, have this stable configuration to begin with; hence are chemically inactive and always found as "free" atoms in nature.

Returning to the composition of the nucleus—the other type of particle it contains, the neutron, is, as its name suggests, electrically uncharged, or neutral. It is like the proton in size and weight, however, and until recently (1932) its existence was unsuspected. The fact that neutrons are uncharged made them difficult to discover, whereas the charged particles betray their presence by losing energy as they pass through matter, exerting electric forces which "ionize" atoms of the material through which they pass.[7]

The fact that neutrons are uncharged also has other important consequences: they are very penetrating, can pass freely in and out of charged areas, are very difficult to control, and are very important agents in effecting nuclear change. In fact, they have become the key tools of atomic technology, as we shall explain when we return to them later.[8]

---

[5] This implies, as is the case, that the *nucleus* of the atom is not affected in any way by any chemical process; only the outer electrons are affected.

[6] The exception is helium, which is stable with only two electrons in the outer shell.

[7] To *ionize* an atom or molecule is to break it apart into positively and negatively charged fragments called *ions*. Particles or radiations capable of producing ions in their passage through matter are called *ionizing radiations*.

[8] A technical treatise would include mention of the discovery, also in 1932, by C. D. Anderson at the California Institute of Technology, of a particle emitted by artificially radioactive nuclei called the *positron*. It has the same mass and energy as an electron (and for this reason is sometimes referred to as the "internal electron") but the charge is positive instead of negative.

There are other postulated particles, invented to explain internuclear forces (e.g., mesons, neutrinos), but their existence can safely be ignored for our purposes.

Isotopes

A fairly recent discovery in physics (by J. J. Thomson, about 1910) is that almost every type of atom in nature exists in a family of varieties which although differing in mass and stability have the same atomic number and consequently the same chemical properties. These weight-variants of an element are called "isotopes" of that element.[9]

The difference in weight of these species of the same atom is due to a difference in the number of neutrons contained in the nucleus, although all contain the same number of protons and electrons. Many hundreds of isotopes are now known, including both radioactive and stable types. Some naturally occurring elements have no stable isotopes, being composed of atoms all of which have the same mass; others have many. Tin (atomic number 50), for example, has as many as 10 stable isotopes and many radioactive ones.

The isotopes of hydrogen have turned out to be very important in nuclear industry. Hydrogen has three isotopes: One, the most common variety (sometimes called *protium*), having no neutrons in the nucleus; two, having one neutron in the nucleus; and three, having two neutrons in the nucleus. The second form of hydrogen is called *deuterium*, or "heavy hydrogen," and its nucleus is called a *deuteron*. When deuterium combines with oxygen to form water, the product is called "heavy water." The third is known as *tritium*.

The deuteron, like the alpha particle, is another complex particle very important in producing nuclear disintegration.

Two of the isotopes of uranium are very familiar to workers in atomic industry—uranium 235 and uranium 238. The nucleus of each contains 92 protons (atomic number 92), but one contains 143 neutrons, the other 146. Hence their atomic weights or mass are 235 (92 plus 143) and 238 (92 plus 146).

Now let us return to a further consideration of what is involved in radioactivity.

Certain naturally occurring atoms, of which uranium and radium are well-known examples, have somewhat unstable nuclei—that is, their nuclei "spontaneously" rearrange their structure and eject alpha or beta particles and are transmitted into different elements, sometimes with emission of gamma rays. We call this process *radioactivity* or, sometimes, *radioactive decay* or *disintegration*. Almost all the natural elements known to have the property of emitting radiations have very high atomic numbers; that is, they have complicated and heavy nuclei.

One widely accepted theory to account for the presence of some radioactive elements in nature is that the earth was formed aeons ago out of hot and whirling gases, at which time all the elements were unstable. But as the earth cooled, the short-lived ones have got rid of their radioactivity, reaching their present stable form. The only radioactive elements left are those with extremely long half-lives, or are the elements into which these long-lived ones decay. (See *decay series*, page 18.)

[9] The word comes from the Greek "isos" meaning "equal" and "topos" meaning "place," and designates atoms which differ in their weight and in their radioactive properties and origins, yet occupy the same place in the Mendeleev periodic table of the 92 elements (which arranges elements on the basis of their atomic numbers).

The *rate* at which each type of element disintegrates is peculiar to that element, and is unaffected by changes of temperature, chemical combination, or other external conditions. This rate is usually expressed in terms of the time required for one-half the atoms initially present in an appreciable sample of radioactive material to disintegrate. It is called the *half-life*. Some atoms are reduced to half-life in a fraction of a second, while others take billions of years.

When an atom emits an alpha particle or a beta particle (undergoes radioactive decay, or disintegration), it becomes an atom of a different element. Sometimes this new element, in turn, is radioactive, and so on down the line, in a *decay series*. There are three such families or series of radioactive change—the radium series, the actinium series, and the thorium series—involving in all about 40 different radioactive species. The radium series starts from one isotope of uranium, the actinium series from another isotope of uranium, and the thorium series from thorium. In each case, the final product, after 10 or 12 successive alpha and beta particle emissions, is lead of atomic weight 206, which is a stable atom, i.e., it does not undergo further nuclear disintegration.

The quantity of any radioactive element now found in nature is a function of its rate of disintegration, those having a short half-life being present in minute amounts, those with long half-lives in larger amounts.[10] Uranium has an extremely long half-life (4.5 billion years—about the age of the earth), so is the most abundant radioactive element. But there are others, and they all contribute natural or background radiation to our normal environment. In fact, man is constantly exposed to radiations from outer space (called cosmic rays) coming to this planet presumably from the stars, and to radiations from the radioactive elements in the ground, the air, the seas, the metal, wood, and stone of building construction materials, and so on. His body also contains certain natural *internal* sources of radiation, for organisms contain minute amounts of the radioactive isotopes potassium 40 and carbon 14 as normal body constituents.

Artificially Produced Nuclear Disintegration

Nuclear disintegrations were first produced under man's control in 1919, when Rutherford succeeded in changing a few atoms of nitrogen into atoms of hydrogen and oxygen by bombarding them with high-speed alpha particles.

In 1932, when Chadwick proved that there are uncharged particles in the nucleus, which he named *neutrons,* their great potentialities as bombarders of the heavier elements were recognized almost at once by Fermi, who saw that a neutron would be unaffected by the electric forces exerted by the charged particles and so could go on its way unchecked until it made a head-on collision with an atomic nucleus. Since nuclei are very small, such collisions are bound to be very rare, and what happens when it does occur depends on the speed of the neutron, on the weight of the nucleus it hits, and on other factors. In some cases the neutron merely bounces off like a billiard ball, or it may strike a proton in a light hydrogen atom and project it with considerable speed, losing its own speed in proportion. [In such cases, we can detect that

[10] The exceptions are radioactive elements constantly being produced by the impact of cosmic rays in the upper atmosphere.

the collision has occurred, for the proton, being charged, produces ionization.] In still other cases, particularly if the nucleus the neutron strikes is a heavy one, it may be "captured," thus producing an unstable nucleus, which achieves stability by emitting alpha or beta particles. This means that the atoms of ordinarily stable elements may be made radioactive by artificial means. In 1934 Fermi announced that of 60 elements he had exposed to neutron-bombardment, 40 gave rise to radioactive isotopes, none of which had previously existed in nature.

The stage was set for the preparation of synthetic radioactive materials from almost every element, materials with an enormous range of half-lives and energies destined to play a large part in "tracer" operations in chemistry, medicine, agriculture, and industry, as we shall describe in Chapter II. But radioisotopes could not be prepared in large quantities until a rich source of neutrons became available. When the fission process described in the next paragraph occurred, it made possible the building of an atomic reactor which solved the problem of a neutron source, and the vast majority of isotopes now used for practical purposes is prepared by irradiation in a reactor.

Lastly, then, if the neutron strikes the heavy nucleus of a naturally unstable atom, like that of uranium, this nucleus itself may be split into fragments (usually two in number)—i.e., the atom may *fission.*

This first occurred in January, 1939, being achieved by two German physicists, O. Hahn and F. Strassmann; and being identified as a fission process almost simultaneously by physicists Bohr, Frisch, Meitner, Fermi, Dunning, Pegram, and others. Before the year was out, nearly 100 scientific papers had appeared on the fission process; on the possibility that neutrons might be emitted during the process; and on the implication this held for initiating a self-reproducing or *chain reaction* of fission processes.

Free neutrons can be obtained only from nuclear disintegrations; there is no natural supply. The only way we know to obtain them is by putting in their way unstable nuclei which may be split and so emit more neutrons than were absorbed. This is what occurs in a chain reaction—in an uncontrolled fashion in an atomic bomb, and in a controlled fashion in a nuclear reactor.

Methods of Nuclear Bombardment

Perhaps a short statement may be in order on how physicists produce ions or particles of such high energies that they can be used like bullets to disrupt the nuclei of atoms. This was achieved before the construction of a nuclear reactor, of course, and there are still certain scientific purposes for which such methods are superior to the production of radioisotopes in a reactor.

In general, this is accomplished in one or another kind of apparatus called an *accelerator* (a general term for any vacuum chamber in which charged particles may be speeded up). The *Cockcroft-Walton accelerator,* for example, is a device which uses high voltages and a series of condensers to achieve a high direct-current potential, which is then applied to charged nuclear particles, usually to protons. A similar procedure can accelerate deuterons, or alpha particles from helium. These can then be directed in high-energy streams against a nuclear target.

A particle accelerator giving higher energies is the *Van de Graaff* machine (built on the principle of the Faraday ice-bucket experiment). Charges at moderately high voltage are "spit" onto a belt, which discharges them into a hollow sphere, building up to a voltage as high as five million volts. Particles in a tube introduced into the sphere and connecting with the outside receive a resulting high acceleration. As the particles emerge, they may be injected into other apparatus or used directly to bombard nuclear targets. In recent times many powerful accelerators have been constructed, including the *cyclotron,* the *betatron,* the *synchrocyclotron,* the *synchroton,* the *linear accelerator,* the *bevatron,* and the *cosmotron.*[11]

The important fact for students of atomic industry, however, is simply that certain agents, some of them only after they have been accelerated to very high energies, can initiate nuclear reactions by bombarding nuclei. In approximate order of their importance for this purpose they are: neutrons, deuterons, protons, alpha particles, gamma rays, and, rarely, heavier particles. Accelerators are also of interest to state and local regulatory bodies, in connection with the question of protecting workers from dangerous effects of ionizing radiations. For radioisotopes produced by accelerators, unlike those produced by reactors, are not under the control of the AEC, and therefore require some type of state or local inspection and regulation.

PENETRATION OF MATTER BY RADIATIONS[12]

Most atomic nuclei can be penetrated by at least one type of atomic particle or by gamma rays, but different radiations produce different effects in the matter through which they pass. Gamma rays are very penetrating, alpha and beta particles less so. Even so, alpha and beta particles have energies thousands of times greater than the energy changes per atom which take place in chemical reactions.

"Beta particle" is the name given a negative electron, or positive electron (positron) emitted from a nucleus undergoing beta-disintegration. In this radioactive nuclear transformation, the atomic number (number of charges on the nucleus) is changed by 1 or —1, while the mass remains unchanged. When the atomic number is *increased* by 1, we say beta particle (electron) emission has occurred and when it is *decreased* by 1, that a positive beta particle (positron) has been emitted. (The emission of a negative electron from the nucleus does not mean that such negatively charged particles are normal constituents of the nucleus.)

The alpha particle is a positively charged particle emitted from a nucleus, composed of two protons and two neutrons, and so carrying a *double* positive charge. It is identical in all measured properties with the nucleus of a helium atom; so that, by extension, artificially accelerated nuclei of helium atoms are also called alpha particles.

Gamma rays are members of the large family of electromagnetic radiation of different wavelengths, ranging from the long waves of electric power, through the much shorter waves used for radio, television,

[11] The cosmotron, situated at AEC's Brookhaven Laboratory on Long Island, accelerates protons to two or three billion electron-volts.

[12] Discussion of the effects of ionizing radiations upon human tissue is deferred for separate treatment in Chapter VI, pages 130-135.

radar, and induction heating, through the much shorter waves of infrared, visible and ultraviolet light, to the very short X-rays or gamma rays, and finally to the shortest of all, the cosmic rays. X-rays and gamma rays are exactly the same type of radiation, but they were discovered at different times and the two names have been kept to indicate a difference of origin, gamma rays being emitted from radioactive nuclei while X-rays are produced by high voltage accelerators. (Also, most X-rays are of wavelengths longer than those of gamma rays. Their range extends from the extreme ultraviolet into the gamma region.)

Like all electromagnetic waves, gamma rays and X-rays give up energy to the molecules through which they pass. This energy is released in packets known as "quanta," and the shorter the wavelength, the richer in energy are the quanta.

For purposes of comparison: the energy from infrared light can vibrate atoms in a molecule relative to each other, which with few exceptions is directly converted into heat; quanta of visible light have enough energy to excite certain molecules—the ones which appear colored; quanta from ultraviolet light are energetic enough to ionize some molecules by stripping some of the more loosely bound electrons from the atom; while the energies of gamma rays, X-rays, and cosmic rays are high enough to produce ions from almost any atom.[13]

The ions formed by atomic radiation are tremendously reactive. Known as "free radicals," they exist usually for only a minute fraction of a second before undergoing some chemical reaction.

Radiations differ in the effects they produce in matter through which they pass.[14] The energetic X-rays and gamma rays are only slightly absorbed by the matter through which they travel and so may penetrate deeply before giving up their energy, producing ions along their paths.[15] Beta and alpha particles have lower energies and penetrating powers. Beta particles can usually penetrate further than can alpha particles since electrons are repelled by other electrons. Alpha particles are not only heavier, but they continue to exist only so long as they are moving fast enough to avoid collecting electrons. (When it collects two electrons, an alpha particle cancels its positive charge and becomes an electrically neutral helium atom.) There is an overlap in the penetrating power of alpha and beta particles, however, the faster alpha particles being more penetrating than the slower beta particles.

We have already explained why the effects of neutron penetration are more complex than for other particulate radiations. A neutron does not directly produce ions, but it may eventually collide with a nucleus. It may then merely bounce off again or it may be captured by the nucleus and thereby transmute the atom into a radioisotope. However, it may expel a proton from the nucleus. The ejected proton then brings about the ionization of the atoms it strikes. Thus neutrons are *indirect* sources of ionization; and one neutron, ejecting a proton with an energy of 1 Mev, will indirectly ionize approximately 30,000 atoms.

[13] The energy of ionizing radiations is expressed in a special unit known as the electron-volt (ev) and its multiples the Kev (1,000 ev), the Mev (1,000 Kev), and the Bev (1,000 Mev).

[14] See table on page 133, Chapter VI.

[15] It is worth remembering, however, that whatever effects X- and gamma rays have on the matter they penetrate, they do not in turn make this matter radioactive.

Thus neutrons produce dense ionization within irradiated material at depths inaccessible to charged particles entering the material from the outside.[16]

NUCLEAR REACTORS

The fission of atomic nuclei is important to man because it generates energy and heat, releases swift neutrons which induce a great variety of nuclear reactions in the matter they strike, and creates hundreds of isotopes of the formerly known chemical elements. All these processes go on in a controlled fashion in a nuclear reactor, or as it was at first called, an atomic pile.[17]

Only a few materials, heavy and relatively unstable in their natural state, will split in two fragments when struck by a neutron. In fact, uranium and thorium are the only plentiful naturally fissionable materials[18]—the so-called "source materials" of the Atomic Energy Act. (They are also called "fertile materials.") When an atom of uranium 235 splits apart, more neutrons per fission are released than are absorbed. If it can be assured that one of these strikes another uranium atom, causing a second fission, and so on, a chain reaction is established.

Natural uranium 238 makes up 99.3 percent of all the uranium in the world, so only 0.7 percent, or one atom out of every 140, is an isotope which can be split. So methods have been invented to increase the content of uranium 235, the fissionable isotope, in the uranium which is to be used for reactor fuel. This is called *enriched fuel.* Uranium 233 (produced from thorium) and plutonium, a wholly man-made element (produced from uranium 238), are also fissionable. These three materials—uranium 233, uranium enriched in the isotope 235, and plutonium —are named "special nuclear materials" in the Atomic Energy Act. Plutonium has the advantage, being a wholly different element from uranium, that it can be extracted from the fission products by chemical means, purified, and used for a subsequent fission reaction. It is our chief bomb material, and our chain-reacting devices were originally built to make plutonium for atom bombs.

One of the simplest of all reactors[19] consists of a vessel about six feet in diameter and six or seven feet tall, filled with heavy water (water in which the hydrogen component is double-weight hydrogen) in which are suspended 100 rods or bars of uranium.

The uranium (or thorium, or plutonium) bars constitute the "fuel" of this atomic furnace. The heavy water (or graphite, ordinary water, liquid metal, or an organic material) serves as what is called a "moderator." A moderator is needed because a neutron must be traveling relatively slowly to *induce* fission in a uranium 235 atom, but when it is *released* by fission it is traveling at a tremendous speed; so its energies must be reduced without capturing it and thus stopping the chain reaction. This is the function of the moderator.

[16] A glossary of qualifying terms applied to atoms is given in Table I on p. 23.

[17] The name "atomic pile" fitted the original Fermi reactor, which was literally a pile of graphite (carbon) blocks containing a number of strategically placed pieces of uranium oxide and metal.

[18] Thorium (atomic number 90), protoactinium (91), and uranium (92) are all fissionable when bombarded by neutrons. Protoactinium is not used for reactors because of its scarcity in nature.

[19] This description of a reactor is taken in large part from an address given by Dr. Walter H. Zinn, then director of the Argonne National Laboratory near Chicago, to the Governors' Conference in June, 1956, and printed in full in the *Proceedings,* p. 143 ff.

To make the chain reaction work at all, there must be a definite amount and arrangement of uranium 235—the "critical mass"—present or the neutrons generated may escape without striking other fissionable atoms.

Table I

DEFINITIONS OF BASIC TERMS USED IN ATOMIC THEORY [20]

An *atom*—is the smallest particle which exhibits the characteristic chemical properties of an element.

The *nucleus of an atom*—is considered to be composed of protons and neutrons. The number of protons is equal to the atomic number.

An *excited atom*—is an atom which possesses more energy than a normal atom of that species. The additional energy commonly affects the electrons surrounding the atomic nucleus, raising them to higher energy levels.

An *ionized atom*—is an ion; which is an atom that has acquired an electric charge by gain or loss of electrons surrounding its nucleus.

A *labeled atom*—is a tracer which can be detected easily, and which is introduced into a system to study a process or structure.

A *neutral atom*—is an atom which has no overall, or resultant, electric charge.

A *normal atom*—is an atom which has no overall electric charge, and in which all the electrons surrounding the nucleus are at their lowest energy levels.

A *radiating atom*—is an atom which is emitting radiation during the transition of one or more of its electrons from higher to lower energy states.

A *recoil atom*—is an atom which undergoes a sudden change or reversal of its direction of motion as the result of the emission by it of a particle or radiation in a nuclear reaction.

A *stripped atom*—is an atomic nucleus without surrounding electrons; also called a nuclear atom. It has, of course, a positive electric charge equal to the charge on its nucleus.

The *electron*—is a constituent of all matter; thus the normal atom consists of a positively charged nucleus surrounded by a sufficient number of electrons so that their total charge is equal to the positive charge on the nucleus. In recent years it has been necessary to modify the older concept of the electron as a mere electric particle and to recognize that it has wave characteristics, with a frequency and a wavelength.

A *molecule*—is the smallest particle of any substance which can exist free and still exhibit all the chemical properties of the substance. Some molecules, such as those of the inert gases (helium, neon, argon, krypton, xenon) and the radioactive gas radon, consist of a single atom and are therefore identical with the atom.

As soon as this critical mass is reached, the fission of one atom releases neutrons, causing fission there; but more than one neutron is emitted when fission takes place, so the next time not one uranium atom is split, but several. This chain reaction goes on until the fuel is exhausted or the fission process controlled. In the process uranium is "consumed," neutrons and gamma rays released, and fission products "manufactured" or placed in the fuel bars. Heat is also produced, and it is the heat which is used to produce electric energy from a so-called "power reactor."

Let us assume that our nuclear reactor is operating at the power of a very powerful research reactor in this Country (one operating at Arco, Idaho), that is, at 30,000 kilowatts. Such a reactor will have taking place within the bars of uranium 90 million billion fissions per second. Although enormous energy is released, the quantity of fissionable material converted into energy is infinitesimal, so the amount of uranium

[20] Van Nostrand's *Scientific Encyclopedia* (1958) pp. 141-142, 579, 1076, 1077.

destroyed and the amount of the fission product manufactured are about equal. In the reactor at Arco, about one ounce of uranium is consumed each day, and one ounce of radioactive fragments (fission products, or "byproduct material") is manufactured.

About one three-thousandth of an ounce of neutrons is liberated in the machine each day, too, in the course of the chain reaction. Fission products absorb neutrons, however, and hence interfere with the efficiency of the reactor. If this is allowed to continue indefinitely, it will eventually stop the chain reaction; so the fuel must be removed and processed chemically to separate the fission products and reclaim the unburnt material. So at measured intervals, the uranium rods are withdrawn from the reactor and dumped into a tank of water to cool and to lose some of their radioactivity. They are then moved to chemical factories where the fission products are extracted by operations made difficult by the fact that all treatment has to go on behind concrete shields and by remote control.

Fuel elements removed for this purpose are called "spent fuel elements." In some reactor designs the fuel used is in liquid form (a "slurry" or "soup" of uranium oxide held in solution) and *continuous* processing of a portion of the fuel can go forward in a separate loop connected with but outside the reactor, thus simplifying the fuel-cycle.

A certain type of reactor called a "breeder" is so designed and fueled as to create more fissionable fuel than it uses up. One neutron emitted at a fission carries on the chain reaction by causing fission in another fuel atom; another neutron converts an atom of fertile uranium 238 into fissionable plutonium and thus replaces the fuel used; and a third does the same (in a part of the fissions, at any rate), thus producing an excess of fuel over the amount originally put into the reactor. Reactor designs are still in an early state, work to date having been concentrated largely on finding nuclear fuels which will work in unprecedented conditions of temperature, corrosion, and radiation. But many promising ideas are in the experimental stage, including materials and combinations of materials which will reduce overall costs and satisfy other economic and industrial requirements.

Many power and test reactors are designed so that besides their major purpose radioactive isotopes may be made by placing ordinary elements somewhere within the reactor vessel. Phosphorus, gold, sodium, for example, may be transmitted by irradiation near the reactors, producing radioactive phosphorus, gold, sodium, and so on. From 800 to 900 kinds of radioactive isotopes can now be made, with effective life and type and energy of particle known; so that for industrial use a choice may be tailored to specific type of purpose. Of course, for many purposes the "mixed bag" of fission products will serve.

This completes the discussion of terms basic to an understanding of nuclear energy, radiations of different types and their penetrating powers, and the ways in which nuclear energy is controlled in a reactor.[21] Such energy may be used with comparative safety in industrial processes provided well-designed precautions are faithfully taken. The next chapter will describe some of its chief industrial applications.

[21] Appendix A, pages 232-233, explains the units of measurement commonly used in describing radiations, such as "curie," "roentgen" and so on.

CHAPTER II

NATURE AND DISTRIBUTION OF NUCLEAR INDUSTRY IN THE UNITED STATES[1]

This chapter will be primarily concerned with the nonmilitary uses of atomic energy, although for various reasons these cannot be wholly separated from the production of war materials.

By "nuclear industries" will be meant any of the industries which produce or utilize nuclear reactors, X-ray machines, particle accelerators, radiations, or radioactive materials. They may be roughly classified into two main complexes or clusters: those concerned with the design, construction, operation, or sale of *nuclear reactors,* or with the supply of materials, components, and services for reactors; and those which use *nuclear energy products* (radioisotopes and radiation) including firms which process fission products for resale, manufacture equipment incorporating radioisotopes or devices to monitor radioactivity, or offer services employing radioactive materials.

NUCLEAR REACTOR INDUSTRY

Fuel Cycle

The chain of industrial operations involved in supplying uranium or thorium—the natural fuels for atomic reactors[2]—begins with the *mining, milling, and extracting* of these ores. Of the two source materials, uranium has so far been dominant, but thorium may come to be produced in quantity if certain power reactor concepts now under test turn out to be successful.

A thousand or more uranium mines in the western United States are our chief uranium source, but Canada, South Africa, and the Belgian Congo also furnish large quantities. The bulk of domestic ore is found in Colorado, Utah, Arizona, and New Mexico, with lesser but still significant amounts in Wyoming and Washington. California has only a few small and scattered deposits of commercial grade ore.

Mills to concentrate uranium ores are naturally located close to the mines, so milling too is a western-state operation; but of the 23 or more mills operating or under construction, none is in California, for our mines have only a fraction of the tonnage necessary to support a milling operation.

After concentration, uranium is *refined* to remove impurities, meeting standards resembling those of pure drugs rather than of ordinary metal-

[1] Members of the staff of the AEC San Francisco Operations Office were kind enough to read the section of this chapter on the nuclear reactor industry to eliminate errors of fact. The writer alone, however, is responsible for the chapter's final form and content.

The primary source for this chapter is U. S. Atomic Energy Commission, *Atomic Energy Facts* (September, 1957). Other heavily used sources are: B. C. Netschert and S. H. Schurr, *Atomic Energy Applications* (1957); Atomic Industrial Forum, Inc., *A Growth Survey of the Atomic Industry, 1958-1968* (February, 1958); Corbin Allardice and others, *Atomic Power: An Appraisal, Including Atomic Energy in Economic Development* (1957); and Sidney Jefferson, *Radioisotopes—A New Tool for Industry* (1957).

[2] Plutonium, another reactor fuel mentioned earlier, does not occur in nature.

lurgy, and converted into metal ingots. Two AEC-owned refining and conversion plants operate on a cost-plus-fixed-fee basis: one in Weldon Spring, Mo., operated by Mallinckrodt Chemical Works; and one in Fernald, Ohio, operated by National Lead Company. Recently Baker and Co., General Chemical Division of the Allied Chemical and Dye Corp., has responded to AEC encouragement to enter the feed materials field on a private venture basis under extremely favorable conditions. It is constructing a distillation plant to be ready by April, 1959.

When reactor designs call for uranium enriched in varying degrees, the almost incredibly difficult process of *gaseous diffusion* may be used to produce it. Three enormous gaseous diffusion plants, representing a capital investment of about 3 billion dollars, are owned by AEC. Union Carbide Nuclear Corp., a unit of Union Carbide and Carbon Corp., operates the ones at Oak Ridge, Tenn., and Paducah, Ky.; and Goodyear Atomic Corp., a subsidiary of Goodyear Tire and Rubber Co., operates one at Portsmouth, Ohio. The uranium in the gas emerging from the gaseous diffusion process is then reduced to metal for the fabrication of enriched fuel elements.

This next operation, *fabrication* of the fuel, consists of smelting and casting the metal into bars, pellets, or other shapes and "cladding" or encasing them in another metal, usually aluminum, stainless steel, or zirconium, to keep the fuel from contact with the coolant which will surround it in the reactor. These bars are then often grouped into larger assemblies needed by various reactor designs. Care needs to be taken in this process not to produce criticality.

In the preparation of enriched *fluid* fuels, uranium salts are dissolved in light or heavy water and stored in widely separated vessels or pipes, to avoid criticality.

Until 1956, AEC contractor-operated facilities were exclusive fabricators of fuel elements, but now a number of private firms are in this business.[3]

Only about three-fifths of the uranium worked in fuel element fabrication leaves it in the form of usable fuel elements. So another industrial process is that of the *recovery of uranium from scrap* by remelting or chemical dissolution. The AEC is at present almost the only operator in this field, but it is attempting to interest private business to enter here also.[4]

Thorium production, refining, and conversion is carried out on a much smaller scale and by means of simpler processes. Although a very abundant component of the earth's crust, thorium usually occurs in low concentrations and in most cases associated with other materials,

[3] Among them are: Mallinckrodt Chemical Works, St. Louis, Mo.; Babcock & Wilcox Company, New York City; Aerojet-General Nucleonics, San Ramon, Calif.; Atomics International, Canoga Park, Calif.; General Electric Company, San Jose, Calif.; Glenn L. Martin, Baltimore, Md.; Metals and Controls, Inc., Attleboro, Mass.; Nuclear Metals, Inc., Concord, Mass.; Sylvania Electric Products, Towanda, Pa.; Westinghouse Electric Corporation, Cheswick, Pa.; and Combustion Engineering-Olin Mathieson Chemical Company, New Haven, Conn. In 1957 the first license was granted to a private firm to produce enriched uranium metal—to Nuclear Materials and Equipment Company, which also has a license to fabricate enriched uranium into fuel elements.

[4] Nuclear Materials and Equipment Company and Engelhardt Industries are two firms which have announced plans to enter the uranium scrap recovery field. Enriched uranium scrap was worth about $8,000 a pound in January, 1958, according to an end-of-the-year report of Stanford Research Institute. Of course the price depends upon the degree of enrichment.

such as the rare earths.[5] Brazil, India, and South Africa are the principal sources of the ore, the refining and conversion into nuclear fuel being carried out by a number of commercial firms from which AEC contracts to buy its supply.[6]

From time to time spent fuels must be removed from a reactor to prevent loss of reactivity due to the accumulation of fission products, and to recover unburned nuclear fuel and new fuel bred from the material. The third important reactor fuel—plutonium—is obtained from these irradiated fuel elements by solvent extraction operation in plants which must have a number of special design features on account of the intense radioactivity of the materials handled and the need to avoid unintentional critical mass. The *chemical reprocessing of spent fuel materials* is carried out in AEC-owned contractor-operated plants, of which the five major ones are Idaho Chemical Processing Plant at Arco, Ida., operated by Phillips Petroleum Co.; Metal Recovery Plant and Cold Scrap Recovery Plant, both at Oak Ridge, Tenn., operated by Union Carbide Nuclear Corp.; Chemical Processing Plant at Hanford, Wash., operated by General Electric; and Chemical Processing Plant at Savannah, S. C., operated by E. I. duPont de Nemours and Co.

The AEC is encouraging industry to enter the fuel reprocessing field, and in the meantime furnishes this service to owners of private reactors. The Atomic Industrial Forum points out that in this policy the government has conflicting objectives. The best way to encourage the entry of private industry into the reprocessing business is by fostering high processing charges. On the other hand, the way to encourage the construction of reactors, which must have relatively inexpensive processing costs, is to hold reactor operating costs at a minimum. The difficulty of pursuing these dual objectives is seen in the AEC's recent public urgings to industry to enter the spent fuels processing business, while at the same time it establishes a government price for such services which is apparently lower than that which industry can meet and make a profit.[7]

The quantity of fission products produced by a reactor is proportional to its thermal capacity. Each thermal megawatt of reactor power produces each year fission products with an average activity in curies equivalent to about one-fifth of a ton of radium. Such "high level waste" must be stored in leak-proof tanks, usually underground, but in such a way to be inspected periodically for long periods of time. The government usually performs this service, often through contracts with private firms, in conjunction with the recovery processing of spent fuel elements. It is expected that many products now classified as waste, however, may be found to be economically useful and that industry will design and build plants for separating and packaging them.

Besides the fission products separated from spent fuel, there are miscellaneous wastes produced at the reactor site from day-to-day

[5] This term is applied to elements 57 through 71 in the periodic table. The most common one is cerium, element 58.

[6] Principal among these are Lindsay Chemical Co. of Chicago, Maywood Chemical Works of Maywood, N. J., Rare Earths, Inc., and Davison Chemical, both divisions of W. R. Grace and Company of Pompton Plains, N. J., and Heavy Minerals Company of Chattanooga, Tenn., jointly owned by Crane Company, Vitro Corporation of America, and a French interest.

[7] Atomic Industrial Forum, Inc., *A Growth Survey of the Atomic Industry, 1958-1968* (February, 1958), p. 60-61.

operations and from accidental discharges of radioactive materials. The quantities of miscellaneous waste depend on the characteristics of the reactor-types and the waste-handling and equipment maintenance methods employed by their operators. The handling, storing, and disposal of these "low level wastes" is often carried out by private companies, which must obtain an AEC license to perform this service.

Radiological measurement and monitoring of fuel processing plants and power stations must be carried on on a continuous basis. Independent companies are more and more called upon to perform chemical, radiochemical, and isotopic analysis of radioactive materials; while the manufacture of monitoring instruments and film badges, instrument calibration and reading service, biological testing of employees, and plant decontamination service are other activities usually contracted out by the reactor industry. Atomic Industrial Forum estimates [8] that, if it be assumed that about 5 percent of nuclear power plant operating and maintenance costs are for outside services such as these, then the annual dollar volume for them may be around $200,000 to $500,000 in 1962, $500,000 to $1,000,000 in 1966 and quite possibly larger. In addition, much more such service will be required in the fuel processing steps than in operating the reactors, so total dollar volume for such auxiliary reactor services may be several million dollars by 1966. (Appendix C, pages 234-235, present a commercial hazards control program, as a sample of what is offered.)

MATERIALS AND COMPONENTS

The description of a nuclear reactor given in Chapter I reveals that such plants are not basically complex, as are some of the chemical industries. But the fission process affects materials in a number of ways previously unknown to industry, requiring a completely new set of operating conditions and a re-evaluation of all conventional materials. For example, never before have engineers had to pay attention to whether a material absorbs neutrons or not. But the choice of materials is now often dictated by just this consideration, and in spite of obvious inadequacies in other respects, materials like aluminum, zirconium, and other light alloys are used because structurally stronger materials capable of resisting higher temperatures would absorb too many neutrons. Then, too, under the stimulus of intense radioactivity materials deform, or become brittle, as their molecular structures change, or they may set up some new and undesirable chemical reaction. Welds and valves which are quite satisfactory in chemical plants become unusable in atomic industry, where leaks permitting the escape of violently radioactive fission wastes might contaminate the whole plant.

When conventional materials are used, many special processes are required to prepare them for use in the reactor, where they will be bombarded by neutrons and exposed to unprecedentedly virulent radioactivity. Minor impurities in materials, which could safely be ignored in other industries, become intolerable here.

The ultimate test of how materials are standing up to reactor strains is their actual use, and consequently the engineer operating a reactor

[8] Atomic Industrial Forum, Inc., *A Growth Survey of the Atomic Industry, 1958-1968* (February, 1958), p. 71.

has to watch his plant structure the whole time, the long-term effects of continuous neutron bombardment being still unknown.

Materials (other than fuel) required by a reactor system are employed chiefly for: *structural purposes,* such as supports or containers for fuel or moderator, piping systems, welds, and so on; *coolants*—heat transfer media, such as water, air, gas, liquid metal, or organic liquids—which remove heat generated in the reactor; *control materials* to absorb neutrons and thus to keep the chain reaction at a steady state and to stop it; *moderators and reflectors* to reduce neutron energy rapidly and scatter or reflect the particles back into the reactor; and *shielding materials* to absorb heat and reduce neutron and gamma radiation.

The chief substances currently being used in each of these categories are: for structural materials—*zirconium, aluminum, stainless steel,* and *ceramics;* for coolants—*water, heavy water, liquid metals* (chiefly alkali metals like sodium or sodium-potassium alloys), *organic fluids* (principally of the phenyl group), and *gases;* for controls—*boron, cadmium, hafnium,* and *rare earths;* for moderators and reflectors—*water, heavy water, graphite,* and *beryllium;* for shielding materials—*heavy concrete, water, lead or other dense metals,* and *boron.*

While the AEC has in the past produced these materials in contractor-operated plants, chemical and metal companies are increasingly entering the field, most of such facilities being in the eastern part of the United States.[9] However, California supplies 95 percent of the world's demand for boron, the economic importance of which is being enhanced by the many new uses being found for boron 10. This material readily absorbs neutrons yet does not become radioactive, so is suitable for shielding and control mechanisms and for radiation measurement instruments. Also, in August, 1958, American Beryl Corporation started operation in California of a mill to recover beryllium from ore, with a throughput capacity of 100 tons of ore per day, using a new mechanical process to replace the previous hand-recovery method.

Atomic Industrial Forum, for purposes of its industry survey and forecast, selected 10 major reactor components as the chief pieces of equipment found in sizable reactor systems: *fuel handling equipment,* such as cranes or hoists, for rehandling casks and fuel elements; *pressure vessels; control apparatus,* such as rods containing neutron absorbers, and drives or actuators; *heat exchangers* or steam generators; *main pumps* for circulating the primary reactor coolant fluid; *main piping; main valves* to control flow of main coolant; *tanks; instrumentation;* and *waste-handling equipment.*[10] Most reactors have many auxiliary systems as well, involving piping, valves and equipment and electrical apparatus. A study of the 1958-1959 classified directory of nuclear and

[9] Heavy water is produced in AEC-owned plants at Savannah River, S. C., operated by E. I. duPont de Nemours and Company. Reactor grade graphite is produced by a number of private companies, among which are National Carbon, Speer Carbon, and United Carbon Products. Most of the beryl being used comes from Argentina, Brazil, India, and South Africa, but substantial amounts are obtained as a byproduct of some other operations, such as feldspar mining. (But see below re California's new mill.) The two major producers of beryllium oxide are Beryllium Corporation of Reading, Pa., and Brush Beryllium Company (plants largely AEC-owned) at Luckey and Cleveland, Ohio. Zirconium is produced by Carborundum Metals in Akron, N. Y., National Distillers Products at Ashtabula, Ohio, and NRC Metals, a subsidiary of National Research Corporation of Cambridge, Mass., whose plant is in Pensacola, Fla.

[10] Atomic Industrial Forum, Inc., *A Growth Survey of the Atomic Industry, 1958-1968* (February, 1958).

allied industries in the November issue of the magazine *Nucleonics*, shows that California firms manufacture or sell a large share of these components. Manufacture of materials and components for nuclear reactors of all types and for all purposes is increasingly enticing the makers of conventional materials and equipment to introduce an atomic energy division.

DESIGN AND ENGINEERING-CONSTRUCTION OF NUCLEAR POWER PLANTS

Nuclear science and technology were for a long time, and still are to a large extent, supported by governments, spending billions of dollars for basic and applied research and development. In America, however, since 1954, the men and firms employed by the AEC have increasingly put their experience to work for private industry, with the constant encouragement of the AEC which has supplied materials, services and financial assistance.

There are various major purposes for which reactors may be designed, and it will be convenient to discuss them separately. A leading equipment manufacturer, Babcock & Wilcox, lists these purposes as follows: *ship propulsion, central station electric power plants, industrial heat and process applications, conversion of sea water to fresh water, large central space heating plants, production of fissionable and fusionable materials, "package power plants" for remote locations,* large-scale *catalysis of chemical reactions,* and *production of radioisotopes.*[11] We, however, will classify them as power reactors, research reactors, reactors for propulsion, for space and process heating, and for sea-water conversion. Companies engaging in design and construction usually specialize in one or another of these types, although some of the larger firms are interested in more than one.

Central Station Power Reactors

In a nuclear reactor designed primarily for producing electric power, nuclear energy replaces the conventional fuel in generating the steam or gas which drives a turbine connected with a generator.[12] The apparatus of a nuclear power station thus consists of two major systems—the reactor and the electrical generating system. (The production of electricity directly from nuclear fusion is a theoretical possibility and General Atomic, for example, is engaged in a private-power financed four-year study on its possibility.)

A number of general features are common to most reactors. To prevent the escape of radioactivity in case of a major operating accident, a "containment vessel" or sealed structure often encloses the whole building in which the reactor is housed. A "biological shielding" close to the reactor proper protects operating personnel from radiation. Within this is a vessel or tank—the "core" containing coolant and the fuel—in which nuclear fission takes place. The core is designed to permit the entry of "sensing instruments" which monitor the neutron flux[13] and permit control from a control station by rods which can adjust the concentration of fissionable material.

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[11] Atomic Industrial Forum, Inc., *The New Atomic Energy Law—What It Means to Industry* (November, 1954), p. 75-81.

[12] One advantage of using a nuclear reaction, rather than the chemical reactions of conventional combustion, is that for the same quantity of material, the former may produce 2½ million times as much heat.

[13] The neutron flux is the number of neutrons emitted per second per unit area.

The foregoing is a description of the so-called "heterogeneous" reactor. It would also fit the "homogeneous" reactor, except that the homogeneous reactor differs in having its fuel dissolved in a solution which acts both as fuel and as moderator. In some designs, the tank holding this solution is surrounded by a larger vessel which contains a "blanket material," i.e., a slurry of fertile materials, thorium or uranium, which utilizes neutrons escaping from the core to make new fissionable material.

The design of reactors of many types has not unnaturally been pioneered by the AEC and the private contractors they employ. A quick survey of AEC's activities in encouraging the entry of private industry and capital into the nuclear reactor business will serve as introduction to the picture of the present state of the United States reactor business.

In 1954, the AEC undertook a five-year program concentrating on the design, construction and operation of one large nuclear power plant, and five smaller ones called "reactor experiments." The large plant is a heterogeneous pressurized water reactor situated at Shippingport, Pennsylvania—a 100,000-kilowatt plant for which Westinghouse manufactured the reactor and Duquesne Light Co. the turbogenerator, and which Duquesne now operates.[14]

The following January—1955—the AEC offered to underwrite part of the cost of private commercial reactor projects which promised to advance nuclear power technology, in its "Power Demonstration Reactor Program." The first invitation resulted in contracts with the Yankee Atomic Electric Company which several New England power companies joined to form; with the Power Reactor Development Company which Detroit Edison and others joined to form; and with Consumers Public Power District of Columbus, Nebraska.

In September of the same year, the AEC issued a second invitation for proposals, this time for plants of power ranges between 5,000 and 40,000 kilowatts of electricity, calculated to be of interest to rural areas and for export abroad. Of seven public power projects proposed, four were accepted for negotiation—those of Rural Cooperative Power Assoc. of Elk River, Minn.; Wolverine Electric Cooperative of Hersey, Mich., Chugach Electric Assoc., Inc., of Anchorage, Alaska, and Nuclear Development Corp. of America; and the City of Piqua, Ohio. Of these, two have been dropped, leaving only Chugach and Piqua, and Piqua in an uncertain status.

[14] The smaller reactor experiments were: The Boiling Water Reactor, a 5,000 kilowatt plant at Argonne National Laboratory, Lemont, Ill., designed and operated by the laboratory; the Sodium Reactor Experiment, a 7,000 kilowatt plant at Santa Susana, Calif., designed, built and operated by AEC and Atomics International, with Southern California Edison Co. supplying the turbo-generator and receiving the heat for conversion to power; the Experimental Breeder Reactor No. 2, a 20,000 kilowatt plant, designed and operated by Argonne National Laboratory; the Homogeneous Reactor Experiment No. 2, with 5,000-10,000 thermal kilowatt output, designed and operated by Oak Ridge National Laboratory; and the Zero Power Reactor III, designed to perform experiments on criticality, of value to Experimental Breeder Reactor No. 2, and situated at National Reactor Testing Station in Arco, Idaho.

If built, Piqua would be the first commercial reactor to be built without a containment sphere.[15]

In January, 1957, the AEC issued a third invitation, with no limits on type or size, except that the proposed plant should contribute toward commercial utilization of nuclear power and be submitted for completion by June 30, 1962. Under this "round" the East Central and Florida West Coast Nuclear Power Groups (three companies) and the Northern State Power Co. which operates in Minnesota, Wisconsin and North and South Dakota, have submitted proposals.

Besides these AEC-assisted projects, three private companies have started building atomic power plants with their own financing—Consolidated Edison Co. of New York City, a thorium reactor at Indian Point, N. Y.; the Commonwealth Edison Co. of Chicago, the Dresden Nuclear Power Reactor at Morris, Ill.; and General Electric Co., the Boiling Water Reactor at its Vallecitos Laboratory (now in operation). Other firms with more distant projects, for which no direct government financial assistance has been requested are: Pennsylvania Power & Light Co.,[16] New England Electric System, Carolinas-Virginia Nuclear Power Assoc., Pacific Gas & Electric Co., Isotope Products, Inc., and West Penn Group.[17]

Let us now look at what is involved in that facet of nuclear industry devoted to the *engineering and construction* of a nuclear power station. An able summary of the problems it presents is contained in a speech delivered by a vice president of Bechtel Corp., one of the country's leading AEC-employed contractors, now constructing private power reactors as well:

Plant Site Selection

The first problem for the utility and engineer-constructor is selection of a plant site. Four factors require evaluation—the radiological hazard associated with any nuclear plant; transmission line losses; water availability and land values.

In weighing the community hazard associated with a nuclear power plant, the engineer-constructor and the utility will be concerned with the problem of insurance. * * * The major determining factors in nuclear power plant hazard and, in turn, the cost of insurance are the degree of inherent self-regulation provided in the reactor design, the existence or not of a pressure vessel around the plant, the remoteness of the site and the size of the protective exclusion around the plant, and the direction of the prevailing wind which would distribute dangerous radioactive material in event of a nuclear accident.

[15] *Nucleonics* for October, 1958, reports the Piqua reactor may not be built because of an adverse site report. In the tentative view of the AEC's Advisory Committee on Reactor Safeguards, the site is not a suitable one. AEC accepts a major share of the blame for permitting the project to go so far (since September, 1957) before disposing of such a basic issue as site evaluation. All three interested parties—AEC, the builder, City of Piqua, the operator, and Atomics International, the contractor—have said they would not drop the project until a final safety evaluation has been completed. One AEC official commented that the site is "the only spot in the Piqua area where the reactor could go."

[16] This project has since been dropped.

[17] Material above summarized from U. S. Atomic Energy Commission, *Atomic Energy Facts* (September, 1957).

Because of the desire to locate a nuclear plant remotely, transmission line losses are very important—they are directly cash out of pocket for the utility. * * *

Availability of water is a prime essential to any power plant, including even a nuclear plant. * * *

The value of available land for the site is also quite important because of the large exclusion area currently required. Even though a major portion of this exclusion area requirement may be done away with in time, a nuclear plant will probably always require a significantly larger plant site than is required for conventional stations.

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Power Plant Design Problems

* * * a small nuclear station is relatively costly to construct per unit of power output and has high operating costs. On the other hand a large plant, which is more economical to build and to operate, incurs a very large outlay of capital for what is at present an essentially experimental venture. * * * As reactor technology develops and reactors become more reliable, this experimental aspect will be less significant and the size of nuclear generating units can be expected to be generally larger than chemically-fueled units.

In selecting the best reactor design and cycle for a power station two fundamental criteria obtain: Does a particular reactor type possess inherent safety or self-control * * * and how much worth in terms of the overall cost of generating electric energy attaches to high thermal efficiency as determined by high reactor temperature.

In laying out the arrangement and design of nuclear power stations, the utility and engineer-constructor have many new problems, most of which arise because a reactor is an intense source of radioactivity which is dangerous and damaging both to human beings and to equipment. Thus because of the hazard consideration, the layout is likely to be totally enclosed within a pressure vessel capable of holding the vaporized products from any reactor runaway. In addition, heavy concrete shielding must be provided both for the operators and for miscellaneous equipment. All components must be designed for remote operation, and most equipment must be adapted for remote maintenance or isolation in the event that it may become dangerously contaminated. * * *

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Very probably only a very low concentration of impurities will be permissible in the nuclear reactor coolant, both because of contamination and because, in the case of sodium, of increased corrosion.

Manipulators or remote handling apparatus must be provided since a significant portion of all maintenance activity around the reactor and many of its associated components will of necessity require remote handling gear.

A new and unique problem to be considered * * * is radiation damage. All present designs of motors, sensing apparatus, and control apparatus must be checked and possibly redesigned to withstand the tremendous intensity of nuclear radiation in which they will be bathed in nuclear plant service.

Storage and handling of the new fuel for a reactor is fortunately not a difficult problem. However, the handling of the burned nuclear fuel constitutes a distinctly different problem. The removal, movement, and storage of this extremely radioactive material is one of the more dangerous and difficult problems involved. * * *

Control mechanisms must be designed to provide fail safety almost to an absolute degree. Even though a particular reactor design has a self-controlling characteristic, provision must be made to compensate for fuel burn-up and for the build-up of nuclear poison. Thus, some extra fuel must be built into the reactor and, in turn, some operator controllable device must be provided to compensate for and make use of this reserve built-in fuel.

Overall then, four basic criteria are involved in the design of any public utility nuclear reactor heat source—radioactivity, fail safety, remote operability, and remote maintainability.

Construction Problems

The third major area of concern * * * is the construction of the nuclear plant itself.

It is quite certain the engineer-constructor will not become a manufacturer of nuclear equipment, but will continue in the role he has had with conventional plants of being an assembler of apparatus manufactured by others. It seems likely that the suppliers of equipment and components for current conventional stations will put themselves in a position to supply reactors and equipment of more conventional character for use in association with reactors. Some new faces will appear, but probably not many.

A major construction problem is the fabrication and assembly of components both in the suppliers' shops and in the field. The material * * * is extremely radioactive; thus if any long-lived radioactive material escapes to an unprotected area, that area cannot be inhabited or worked in until laborious cleanup measures are effected * * * if equipment in a radioactive area breaks down, maintenance will be many times more costly and difficult. It therefore behooves the designer and constructor of a nuclear plant to build reliability into the plant and to do all work with extreme care. Certainly there will be a demand for leakproof manufacture and assembly operations to a degree rarely required before.

Inspection and test is another important question to be considered in the construction of a nuclear power station. Radiographic inspection will be used to an unprecedented degree in the checking of nuclear plant components and assemblies. All components may be inspected and individually tested before assembly, and systems of components will be thoroughly tested after assembly and before use.

In conclusion, many new and unique problems will have to be solved in designing and building nuclear power stations. Nevertheless I feel sure that both successful and economical design and construction will be accomplished by the utilities and the engineer-constructors who serve them.[17]

Reactors for Research, Education and Training, Testing, and Medical Therapy

AEC lists five major design-types of research reactors, varying in type of fuel used (whether fluid or solid; enriched to some degree or not), type of cooling used, and moderating material selected. They also vary in the size of irradiation space available for experiments—the number of channels or access ports available—and in the radiation per unit time afforded. (This latter is measured by the "neutron flux," i.e. neutrons per square centimeter per second.)[18]

The basic determinant of the type of reactor to be developed is, of course, the use to which it is to be put. A partial listing of the uses of research reactors typical in 1957 is given in Table II, page 36.

Reactors for education and training purposes are usually small, with relatively low flux level and heat output. Many available today are of safe design, affording little danger to trained users or to the public through their operation; and educational institutions of college level with up-to-date science departments are coming to regard a small educational reactor as a necessary part of their equipment. But larger ones bring heavy responsibilities in their wake.

As C. Rogers McCullough, Chairman of the AEC's Advisory Committee on Reactor Safeguards, puts it:

> If the university is a little more ambitious and wishes to have a higher powered reactor then there is a site or location problem. It happens in many cases that the university wishes to have the reactor close to the campus, the classrooms and the laboratories. This is possible to achieve with adequate public safety if the reactor is a well-understood design; it is very carefully designed; it is operated in a careful manner, undertaking experiments in which there is no significant risk, and finally, if it is contained in a tight vessel. There are two such reactors located in the hearts of cities in the United States today. * * * But owners of these two reactors have assumed additional circumscription and additional expense in order to have this convenience.[19]

There are at present in the United States some 70 research reactors under construction or in operation.[20, 21]

Testing reactors are larger, with high flux levels; and are much more expensive to build. In a testing reactor a number of features may be

[17] Atomic Industrial Forum, Inc., *Atomic Energy—the New Industrial Frontier* (October, 1955), p. 103-05.

[18] Atomic Energy Commission, *Atomic Energy Facts* (September, 1957), Ch. VIII.

[19] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 10.

[20] *Ibid.*, p. 9.

[21] Among the chief American builders and designers of these specialized reactors are Aerojet-General Nucleonics (Calif.); Atomics International (Calif.) Nuclear Division of Daystrom, Inc. (N.J.); General Electric (Calif.); Kaiser Engineers (Calif.); Bendix Aviation (Mich.); American Radiator and Standard Sanitary Corporation (Calif.); AMF Atomics (N.Y.); Lockheed Aircraft (Ga.); Westinghouse Electric (Pa.); Babcock & Wilcox (Pa.); and ACF Industries (Washington, D.C.). About half of these companies, it may be noted, are in California. *Atomic Energy Facts*, op. cit., p. 154-156.

Table II[22]

TYPICAL USES OF THE RESEARCH REACTORS

		Approx. minimum neutron flux required (Neutrons per square centimeter per second)
Production of Radioactive Isotopes:		
Gamma radiation sources	For example, naturally occurring cobalt 59 bombarded by neutrons yields cobalt 60 which upon disintegration gives off powerful gamma rays.	
Tracer elements	For example, a beta emitter, nitrogen 14, forms carbon 14, a 5,740-year half-life beta emitter	10^{10} to 10^{13}
	For example, a beta-gamma emitter, tellurium 130, forms iodine 131, a seven-day half-life, beta-gamma emitter.	
Fundamental Investigation in Nuclear Science:		
Neutron diffraction	Neutron beams used to study atomic structure; especially useful to locate light and magnetic atoms which are not detected by X-rays	10^{12}
Cross section measurements	Determining the interaction of neutrons with materials; the property of capturing or scattering neutrons is measured and expressed as the cross section	10^{8} to 10^{10}
Applied Research in Power Reactor Development:		
Shielding studies	Direct radiations from the reactor used to study attenuation and capture in various combinations and geometries of material	10^{10} to 10^{11}
Radiation damage to materials	Evaluation of the cumulative effect of radiations on the properties of materials used in construction	10^{13} to 10^{14}
Long time burn-up evaluation	Fuel materials subjected to long-term irradiations to determine their stability	10^{12} to 10^{14}
Medical Therapy:		
Cancer treatment	Neutrons bombard a boron 10 solution which has been absorbed selectively in cancerous tissue; the boron 10 emits short-range alpha particles which are very destructive to the diseased tissue	10^{12}
Analytical Uses:		
Mechanical testing	For example, a material subjected to wear is irradiated prior to test; subsequently, as the radioactive material is worn away, samples are collected and monitored to determine rate of wear	10^{11} to 10^{12}
Chemical tests	Some materials are not made appreciably radioactive by irradiation, yet the included impurities may be readily activated. Impurities in irradiated samples may be determined in very minute amounts—up to one part per billion	10^{12}
Training in Reactor Engineering:		
Teaching	Training in the fundamentals of reactor design, control and operation	0 to 10^{2}
Research problems	Studying the fundamentals of reactors and performing original research experiments	10^{5} to 10^{6}

added to those noted above in describing a power reactor. For example, a removable plug in the biological shield allows the insertion of bulky objects for irradiation; a tube inserted near or in the core permits inserted samples to get very intense exposure; an experimental loop permits test of different types of coolants or of fuel elements under conditions simulating those of a power reactor; and various other similar arrangements permit variegated uses of large or small quantities and intensities of irradiation. There are three non-AEC-owned testing reactors under construction or in operation in the United States, one being GE's at Vallecitos, near Pleasanton, Alameda County.

To quote Dr. McCullough again:

> These three reactors are all in suburban locations, and are of a modest power level, from 20 to 60 megawatts at the top. Because of their suburban location they will be restricted probably in the kind of experiments which they can undertake. A testing reactor is built for the purpose of experimenting on materials, including fuel elements; therefore accidents can be expected. The reactor itself is selected as a very safe, well-understood type, but the experiments are for the purpose of finding out what happens, and even for testing materials to destruction. Therefore, a certain amount of releases of radioactivity from the experiment must be expected.
>
> At the present time these machines, even though they are in a suburban location, must be put in tight steel containers. The containers avoid releasing radioactivity to the public. * * * High-power reactors for testing are for the more daring and more high-powered experiments in nuclear energy and are properly located on the desert in Idaho.
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> * * * * *
>
> Most "reactor experiments" are now being carried out by the Atomic Energy Commission in suitable locations. * * * Reactor experiments would be very much of a state and regional problem because they inevitably must release rather large amounts of fission products if an accident should occur.
>
> * * * * *
>
> Distance cannot be swapped for containment; they are not the same thing. But if you have some distance around the reactor then there is less need for the container because the weather conditions may dissipate to some extent the radioactivity which may escape.[23]

Specialized *medical reactors* may be used to produce very short-lived isotopes right at the hospital; or to produce beams of neutrons or gamma rays for use in research on new methods of diagnosing or treating illnesses.[24]

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[23] *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government*, op. cit., p. 10, 11.

[24] Brain cancer, for example, may be treated by administering normal boron (which is taken up more readily by cancerous than by normal brain tissue) and then exposing the head of the patient to neutron bombardment. The neutrons strike boron atoms taken up by the cancerous tissue, make them radioactive, and the alpha particles given off as these atoms decay administer a therapeutic-sized dose of radiation to the diseased parts. Because of its short half-life and the short distances alpha particles travel in tissue, a localized dose of radioactive boron can be given without undue damage, it is believed, to good brain tissue. Example cited in Corbin Allardice, ed., *Atomic Power: An appraisal* (1957), p. 49-50.

Reactors for Propulsion

Heat from nuclear fission may be used not only to generate steam for stationary power, but to propel a vehicle—submarines and other ships, aircraft, trains, trucks, tractors, automobiles. What is the status of this facet of nuclear industry?

A. *Marine Reactors.* In February, 1957, the United States Navy announced that henceforth all its submarines would be atomic-powered, and it has commissioned construction of 13 (or more) submarines, a guided missile cruiser and an aircraft carrier.[25] Many companies are under contract with the AEC and the Department of Defense as well to make feasibility studies of types of marine reactor plants, operating efficiency studies, design of hulls, and so on. General Electric, Westinghouse Electric and Combustion Engineering (N. Y.) companies do most of the navy's design work.

According to a study made by Stanford Research Institute in late 1957, while the United States is the only nation with a fully authorized and financed program for a nuclear-powered merchant ship, Great Britain, Japan, Italy, France, Norway, Sweden, Western Germany and the Netherlands have fairly advanced programs directed toward technical and economic evaluation of nuclear propulsion for merchant ships. Denmark, Greece, and Switzerland have also given attention to this prospect. Russia and Poland are presumably under way in nuclear-ship programs. The Russians have announced construction of a nuclear-powered icebreaker and the Polish of a 35,000-ton nuclear-powered tanker.[26]

The AEC and the Maritime Commission in April, 1957, awarded a contract to Babcock & Wilcox to design, construct, and operate a 20,000-shaft-horsepower nuclear reactor for the first nuclear-powered merchant ship, the *N. S. Savannah,* to be in action by 1960. Among the AEC contractors making studies of reactor-types other than that used in the *Savannah* (which has a pressurized water reactor) are: Atomics International, Westinghouse Electric, American Machine & Foundry, General Electric, General Atomic, and Aerojet-General.

A growing nuclear maritime industry is practically assured,[27] and with its needs in mind some American companies are beginning to

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[25] Conventionally powered submarines can operate for only about an hour at high speed when deeply submerged, while the *Nautilus,* first atomic submarine, cruised over 1,600 miles at great depth, non-stop, at an average speed of sixteen knots. It operated two years on a single fueling; traveling 62,560 nautical miles, more than half of them while fully submerged. From: Corbin Allardice, ed., *Atomic Power: An Appraisal* (1957), p. 51.

[26] Ashton J. O'Donnell, "World Progress with the Atom—Since Geneva," *Stanford Research Institute Journal,* Fourth Quarter, 1957.

[27] Other examples indicating this may be cited. *Nucleonics* for September, 1958, pointed out that Japan submitted to the first Geneva Conference in 1955 a specific design for a 20,000-ton 23.5-knot emigrant ship, to be propelled by nuclear power. Japanese have been emigrating to Latin America for 50 years, to relieve population pressure at home, but at present Japan has only five ships equipped for this service, with a capacity of 8,000 emigrants a year and a transit time of 40 days one way. One nuclear-powered ship, with a pressurized-water reactor and shielding and containment principles by and large like that of the *Savannah,* would carry 2,300 emigrants, 200 passengers, 8,000 tons of cargo outbound; and 400 passengers and cargo back to Japan, making five round-the-world trips a year—from Kobe to the east coast of South America and back by way of San Francisco. This would save 2,900 sea miles, 31 days at sea, and 22 days in port per voyage, as compared with a conventional ship which could make only three trips a year.

A report from Stanford Research Institute, March 29, 1958, states that a British firm, Mitchell Engineering, has described a completely automated, nuclear-propelled submarine tanker which would operate automatically between its destined ports without a crew.

The same report mentions that a patent has been granted Dr. K. H. Morgenstern of Nuclear Corporation of America for a freighter design that uses radia-

develop capacity for manufacturing components, installing and servicing nuclear propulsion plants. Maryland Shipbuilding Corporation, for example, hopes to offer this service for major ports of the world as they begin to require such special facilities for a nuclear-powered merchant marine.

Are nuclear-powered merchant ships economically competitive? A study by American-Standard Company, issued in September, 1958, on the occasion of the Nuclear Merchant Ship Symposium in Washington, D. C., reports that such ships can now compete economically with conventional ones, on long trade routes, and at high speeds. Ore carriers and tankers are said to have the best potential for economic use of nuclear power. This conclusion is confirmed by a research report soon to be issued by Stanford Research Institute, under AEC contract. The study estimates shipping costs for general cargo, tankers, ore carriers, passenger-cargo and passenger vessels, for 1957, 1965, and 1970. Among its interesting conclusions is that the nuclear propulsion of merchant ships will have no important effects on shippers in the near future, except in the case of tankers.

B. *Aircraft Propulsion.* Research is in progress toward nuclear-powered aircraft. A critical experiment reactor to aid research on aircraft propulsion is to be operated for the U. S. Air Force by Lockheed Aircraft Corporation at its Georgia nuclear laboratory. The reactor was designed and built by General Electric at its atomic equipment plant at San Jose.

The McKinney report, however, predicted that commercial development of nuclear aircraft, if ever attained, will be a military byproduct. It is likely that the first such commercial planes will be cargo aircraft, in which only the crew would need protection. High capital costs would need to be offset, as with ships, by a high use factor, which means long regular flights with quick turnaround. It was noted that the radiation hazard present in plane crashes will be a serious deterrent to commercial development.[28]

C. *Rail Propulsion.* The possibility of nuclear-propelled rail locomotives has been studied under AEC contract since 1955 by the Baldwin-Lima-Hamilton Corporation, Denver & Rio Grande Western Railroad Company, and Walter H. Kidde Associates. Feasibility studies are continuing and a long-range program for research being established.

But here too the hazards of having reactors moving about the countryside at high speeds, even if costs were favorable, are very serious. The dangers from accidental release of highly radioactive materials; and the difficulty, indeed the tragedy, of dealing with a heavily contaminated area in the heart of a big city can hardly be overestimated.

D. *Automobile and Truck Propulsion.* Costs and operating problems raised in this type of land transportation, as well as safety factors,

tion from nuclear reactor wastes instead of refrigeration to preserve perishables being shipped from one country to another. The radioactivity could also be used to process chemical raw materials during shipment.

[28] U.S. Congress. Joint Committee on Atomic Energy. Panel on the Impact of the Peaceful Uses of Atomic Energy, *Peaceful Uses of Atomic Energy: Report*, v.1 (January, 1956), p. 78-80. This report was the work of a panel of experts chaired by Robert McKinney.

are of such fearsome proportions that these applications of nuclear energy for civilian use seem quite unfeasible in the foreseeable future. However, the Army Transportation Corps is studying nuclear power for tractors (as well as for locomotives and tugs) as there is the possibility that nuclear power might be feasible, for very large pneumatic-tired vehicles, for service in uninhabited deserts or Arctic wastelands.

Reactors for Space and Process Heating

Nuclear generation of heat for buildings (space heating) and for industrial operations (process heating) is distinctly possible on an economic scale. Such projects are being intensively promoted abroad. Norway, for example, which has abundant hydroelectric power, is currently more interested in nuclear heat than in nuclear electricity; and Sweden, which imports fuel for 70 percent of its energy needs, has designed a power reactor which will produce heat for a city of 30,000 people, and is scheduled to begin operation in 1960.

At GE's AEC project in Hanford, Wash., byproduct heat from plutonium production reactors heats buildings in the project safely, reliably and economically. It is likely that a reactor designed specifically for low-energy heat production, safe to operate and with maintenance-free service, would be in demand for hotels and office buildings in America.

As for process heat, it is in far greater demand in the United States than is heat for power. Paper manufacturers, steel mills, ore processing plants, and other industries which require vast quantities of heat, are definitely interested.

What is the status of this facet of nuclear industry?

Lockheed Aircraft Corporation's nuclear division in Georgia announced in April, 1958, that it is ready to manufacture industrial heat reactors which are competitive with conventional sources.

The atomic energy division of American-Standard has stated that a heat-producing reactor whose unit cost compares favorably with present costs in many regions of the United States, could be in operation by 1960. American-Standard's reactor would generate steam at a cost of 61.1 cents per million b.t.u., would produce water or steam at 400 degrees Fahrenheit and could be built with a capital investment sufficiently small to be risked by most major manufacturing firms.

Michigan Chemical Corporation has announced that it plans to ask AEC for financial aid in constructing a 2.5 million dollar process heat reactor, with initial costs of steam at 81 cents per 1,000 pounds of steam—compared with 92 cents for its present oil-fired system, and with 82 cents for a coal-fired boiler.

The Army's Package Power Reactor is a dual-purpose one, supplying both electricity and heat (although it is too large to be easily transported to remote locations, as was intended). At Fort Greely, Alaska, a reactor modeled on the Army's is to be built, to produce the same amount of electricity (1,700 kilowatts) and twice as much heat (42 million b.t.u per hour of steam for space heating.)

Reactors for Converting Sea Water to Fresh Water [29]

For six years or more the Office of Saline Water, an agency of the Department of the Interior, has been conducting research looking to the desalting of sea water and brackish water to meet the tremendously increasing water demands in the United States, where consumption is expected to treble in the next 20 years. In July, 1958, this office combined with the Water Authority of the State of California to underwrite a $100,000 study by the Fluor Corporation, on the feasibility of using nuclear power for such a salt water conversion plant.

Fluor's approach to the problem was to propose a water distillation plant at a cost of approximately 60 million dollars, to be used in connection with a nuclear reactor. It is designed to produce from 10 to 20 million gallons of fresh water per day, with the possibility of reducing costs by selling steam-generated electricity as a byproduct.[30]

The cost is now reported to have been brought to about 50 cents per 1,000 gallons, with indications that these may be reduced to as low as 10 cents per 1,000 gallons.

SUMMARY OF THE STATUS OF REACTOR DEVELOPMENT IN THE UNITED STATES TO DATE

By far the largest number of reactors in this country are either military or AEC-owned-and-operated.

There is one *commercial power reactor* operating, and four are under construction.

There are two test reactors operating, and one under construction.

There are 23 non-AEC *research reactors* operating, 30 more being built, and 17 more planned—a total of 70.

Besides this, there are 13 non-AEC *critical experiments* being operated or under construction.[31]

As to the current *rate* of activity in nuclear reactor construction: the year 1958 saw the completion of 37 nuclear reactors of all types—one small power experiment reactor, 27 relatively small research and training reactors, two powerful test reactors and the rest reactors built for the military program. These military projects included the Army's small transportable power-and-heat reactor, two reactor engines for the new atomic submarines, a dual-reactor land-based prototype for the N.S. Savannah, a land-based prototype for another type of submarine, and a ground-test experimental reactor designed for rocket propulsion.

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[29] This example of a specifically-designed use for a power reactor perhaps does not merit separate classification in a discussion of reactor-types; but neither does it exactly fit any of the other classifications. In any case, such a projected use of nuclear power is of intense interest to California Legislators and citizens, to whom water resources constitute a major problem. An editorial in the *San Francisco Chronicle*, January 20, 1959, points out that fresh water is now being distilled from ocean water for industrial purposes at Morro Bay; the City of Coalinga has set up a privately developed conversion process for making its brackish water sources yield domestic supplies. * * * Thirteen California communities—including Belmont, San Mateo County, through its municipal water district—have entered bids for one of the five saline water demonstration plants for which Congress authorized $10 million last year. Governor Brown's budget request for 1959-1960 will include $1.6 million for co-operation with the Federal Government in constructing a sea water conversion plant. The project would include a nuclear reactor as a source of energy. *San Francisco Chronicle* (January 23, 1959).

[30] *Atomic Energy Newsletter*, July 22, 1958.

[31] Atomic Energy Commission, *Twenty-Fourth Semiannual Report* (July, 1958), Appendix 9.

Construction was begun on 45 reactors, including two which will produce power commercially for consumers in Nebraska and Minnesota, the power-and-heat reactor for Chugach, Alaska, three large test reactors, two small power experiment reactors, and 15 naval and marine reactors.

Three contracts for overseas construction of reactors were received by United States firms—one for the Italian government, with financial assistance from the World Bank, and two smaller reactors for Cuba and West Germany.

Other highlights of nuclear industry in 1958 include the completion of 8 new uranium ore mills, the sale of at least 39 particle accelerators, acquisition of large gamma-radiation sources by five industrial companies, award of the contract to build the Army facility for food preservation through irradiation, and the completion of two new facilities for preparing nuclear reactor fuel.[32]

It is perhaps appropriate to close this section with a forecast of the nuclear reactor business in this country for the next 10 years, issued in 1958 by the chief organization representing private nuclear industry.

> By the end of 1957, 76 megawatts of net electrical capacity, including experimental power prototypes, was in operation. Work in varying stages is actually underway on an additional total of about 500 megawatts (p. 19).
>
> Continuation of research, development and new construction equivalent to that now in progress could, under the most optimistic assumptions, result in an economically competitive nuclear plant in 1964 at the earliest, and a total U. S. capacity by 1968 of about 6 million electrical kilowatts. Under pessimistic assumptions, an economic plant would not appear until after 1968, and a capacity of only about 2 million kilowatts would be built by 1968. * * * In the U. S. a major purpose of building small power reactors is to improve the technology and performance of large central station reactors; the average rate of construction of such plants for prototype experience will range between 20 and 60 electric megawatts per year, and may be matched in the late 1960's by a comparable volume of construction of test reactors, process heat units, and plants fabricated in the U. S. for foreign use. * * * Throughout the next decade the building of the naval, military and maritime propulsion group of reactors (of which the Navy's share comprises about 90 percent) is estimated to increase at a steady rate. This assumes that present defense budget levels are maintained. With the introduction of the first surface ship units in 1960, the total installations of naval reactors will approximate 200 electrical megawatts per year, and may increase to more than three times this rate by 1968 (p. 8).
>
> The estimated annual dollar volume of sales for U. S. large nuclear reactor systems (exclusive of turbogenerator plants and their accessories) will increase from approximately 300 million dollars in 1960 to a probable range of from 350 to 660 million dollars in 1968. Of these totals the naval, military and propulsion group of

[32] Atomic Industrial Forum, Inc., *News Release* (December 24, 1958).

reactors comprise from 40 to 80 percent (excluding any expenditures for the aircraft nuclear propulsion program). * * * In the early 1960's, the estimated annual dollar volume of business in small reactors will rise to a level which will temporarily equal or exceed that of large nuclear power plants, because of: the need to continue technological development, the relatively high unit cost of small and experimental plants, and the probable low volume of large plant construction (p. 9).

The survey has some interesting estimates of this country's export business in nuclear reactors over the next 10 years:

It is estimated that in the next decade approximately 20 to 30 percent of the installed value of United States-type plants built in Europe will prove to be business available to United States designers and producers. This business would involve designs for light water and heavy water systems, and relatively specialized components such as control apparatus, fuel cores, and a portion of the pumps, pressure vessels and heat exchangers which require special fabrication. The majority of nuclear system equipment and all conventional equipment and materials will probably be supplied from European sources.

Prospective United States sales to these countries are estimated to range from 200 million dollars to 380 million dollars total ordered through 1965 (or in operation in 1969).[33] This is perhaps 10 percent of the total United States domestic reactor business during the same period. Prospective nuclear construction in all other free world countries except the United Kingdom would add 30 to 40 percent to the above estimates (p. 9).

While the largest volume of foreign reactor construction of interest to industrial producers in the next decade will be in Western Europe, the next largest volume probably will be in Japan (p. 47).

In Japan, probably on the order of several hundred megawatts should be expected in the next 10 years, depending on political questions. Such a figure would be no larger than for the Western European countries outside Euratom (p. 50).[34]

According to close observers, however, America will have difficulty in exporting reactors in competition with European builders for long: its patents and cross-licensing program under AEC are discouraging, labor costs are higher, and problems of international insurance remain unsolved. America can continue to export its engineering knowhow for some time, however, and companies which enter into arangements abroad by which labor and materials of those countries are employed under American supervision may continued to build American trade in reactors.

An American journal points out that, according to an AEC survey just made, in the three years since the first nuclear power plants went

[33] In the U. S. the average time between placement of major equipment orders for a large nuclear power plant and completion of the project for operation is approximately three years. Orders placed in 1965 will result in plants which begin operation in 1968 (four years for foreign plants ordered here), p. 24.

[34] Atomic Industrial Forum, Inc., *A Growth Survey of the Atomic Industry, 1958-1968* (February, 1958).

on sale, only two have actually been sold abroad by United States and British concerns. Westinghouse Electric Company, the first to land a foreign contract, is setting up a small, 11,500-kilowatt plant in Belgium, and a British concern recently got an order from Italy for a 200,000-kilowatt plant. General Electric Company's contract for a plant in Italy is still under negotiation. However, many countries have bought and are buying research and training reactors from the United States and Britain to train their own scientists and engineers.[35]

This completes the description of the nature and extent of the nuclear reactor sector of atomic energy business in the United States, and the companies prominently identified with it. Let us now turn to the other chief cluster of industries involved—those making use of nuclear products, of radioisotopes and radiations. There is of course an overlap in the two categories.

USES OF RADIOACTIVE ISOTOPES AND RADIATION IN INDUSTRY[36]

According to a recent study, the AEC, as of December 31, 1957, had authorized about 1,667 industrial organizations, in 1,200 licenses, to use radioisotopes for industrial purposes. (By May 31, 1958, there were 1,334 such licenses.) This compares with 18 in 1946 and 893 in May, 1954. Licensees included 250 of the 500 largest industrial corporations in the United States, although only about six-tenths of 1 percent of the total United States mining and manufacturing concerns were so licensed.

Probably, as many writers claim, there is hardly a type of industry in which radioactive materials could not be put to use, either for research or for process control. Development of new applications of radioisotopes is indeed spectacular, and most of the difficulties which attended the early stages of their use are being eliminated by the invention of new techniques. About three-quarters of the industrial applications fall into the categories of gaging, radiography, tracer applications, and process control.[37]

In December, 1957, the AEC established an Office of Industrial Development, concerned principally to develop industrial and agricultural uses of radioisotopes and nuclear radiation. Prices of five long-lived fission products have been reduced an average of more than 90 percent, to accelerate their use; and six-week training courses will be offered this summer at the Oak Ridge Institute of Nuclear Studies in the techniques of using radioisotopes in industry. AEC shipments of radioisotopes for the first eight months of 1958 totaled 158,828 curies, almost equal to the total for all of 1957; and more than 100 commercial firms now receive AEC shipments to be reprocessed as radioactive pharmaceuticals, labeled radioactive compounds, and sealed sources of radioactivity.[38]

[35] *U.S. News and World Report* 45: 84, December 26, 1958.

[36] Unless otherwise noted, we are indebted for most of the examples of industrial uses of radioisotopes cited in this section, as well as for some of the explanatory material, to Sidney Jefferson, *Radioisotopes—A New Tool for Industry* (1957).

[37] National Industrial Conference Board, *Industrial Uses of Radioisotopes;* by John J. McMahon and Arnold Berman (April, 1958).

[38] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 5.

Nucleonics for October, 1958, reported

> Four million dollars is going to the AEC Office of Industrial Development for the first year of an ambitious program to promote the use of low- and high-level radiations. The AEC will now do the kind of pump priming of research and development to hasten commercial utilization of byproducts that it has been doing for several years in the reactor field. It will attempt to develop uses for entire industries or groups of industries, and virtually all of the work will be done by private industry but with AEC financial support.[39]

The magazine then lists industrial and research organizations which had received AEC contracts between June and October, 1958, for studies looking to expanded use of radioisotopes:

> Sixty thousand dollars to Stanford Research Institute for research in medical applications; $49,000 to Tracerlab for gas analysis; $61,000 to General Atomic for isotope production; $76,000 to Atomics International (in the field of high-level radiations) on the use of sodium coolant as a radiation source.
>
> Other awards went to Battelle Memorial Institute ($33,000), Nuclear Science and Engineering ($22,500), National Industrial Conference Board ($30,000), Emerson Radio with others ($86,847), Curtiss-Wright ($1,605,000), Armour Research Foundation ($53,000), Radiation Applications ($32,300), and W. H. Johnson Associates ($87,000).

At this point it may be useful to recall some of the principal facts about radioactive materials in order to follow the rather simple and straightforward ways in which it is being put to use in industry.

Alpha particles, beta particles, and gamma rays are spontaneously emitted from radioactive substances.[40] Alpha particles, being two protons and two neutrons, carry a double positive charge. Beta particles are electrons (negatively charged) ejected from the atom, and moving at high speeds. Gamma rays are packets of energy identical with X-rays.[41]

Some radioisotopes radiate only alpha particles or only beta particles, others beta particles and gamma rays, and still others emit all three.

Being heavy and relatively slow, alpha particles are more easily stopped by solid, liquid, or gaseous matter than are faster particles or high-energy waves. Moreover, they continue to exist only as long as they move fast enough to avoid collecting electrons. (The addition of two electrons to an alpha particle cancels its positive charges and turns it into a normal nonradioactive helium atom.)

Beta particles having higher velocity and being repelled by other electrons, have superior penetrating power; although some high-energy alpha particles can be faster and therefore more penetrating than beta particles at the low-energy part of their spectrum.

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[39] *Nucleonics* (October, 1958), p. 21.

[40] Neutrons are not spontaneously emitted from radioactive materials. To project them requires the energy of a bomb, a nuclear reactor, a particle-accelerator, or similar device. In discussing industrial uses of radioisotopes, therefore, only the other three types of radiation—alpha particles, beta particles, and gamma or X-rays—will be considered.

[41] Not all X-rays, however, are in the wave-length range of gamma rays. The wave-length range of X-ray extends from the extreme ultraviolet into the gamma ray region.

Gamma rays have enormously greater penetrating power than either type of particle, although here again the lowest-energy gamma rays are about equal in penetration to the highest-energy beta particles. So there is an overlap in the penetrating power of the three types of radiation, depending upon their energies and other circumstances.

Let us now survey what must be considered in contemplating their use in industry.

Before employing radioactivity one must select radiation of the type, energy, degree of penetration, and length of effective life suitable to the use to which it is to be put.[42]

Next, methods must be devised to keep the radiations from reaching the human body—or, if they reach it, to keep them at as low a level as possible. In addition, radioactive material must be prevented from entering the body. With these hazards in mind, the radioactive material chosen for some processes (e. g., treating cattle-food mixtures) may be of such low energy and short half-life that it can actually be eaten or inhaled (according to present medical belief) without harm.[43] Materials whose use requires that they maintain their radiations for long periods, on the other hand, may be made safe by total enclosure in some container, so that no contamination by ingestion is possible. The danger which then remains is that of external exposure to radiation, and this can be limited by using a container of sufficient thickness and density to cut down the radiations except in the desired direction; by reducing the time of exposure; by increasing the distance from the source; or by all three methods.

As a check on safety of operations, frequent monitoring by various means may be a requirement. The best-known radiation-detection device for charged particles is the Geiger counter, often used in connection with a portable ratemeter. When a Geiger counter comes within a few feet of a radioactive source, it is triggered by some of the gamma rays and passes short electric impulses to the ratemeter, where a pointer shows the rate of their arrival. They can also be heard as clicks on earphones connected to the ratemeter, a rapid increase in their frequency drawing attention to the existence or location of a source of radiation.

Gamma and X-rays, being very short wave-length forms like light, are effectively detected by measuring the secondary "light" effects produced in special crystals. These detectors are called scintillation detectors.

There is indeed a wide variety of instruments available commercially, each type designed to measure a specific type or types of radiation—gamma, beta, alpha, or neutron intensity. The more sensitive detectors are difficult to use without training and experience.

For recording weekly exposures received by working personnel, a photographic film badge, which can be developed each week, is used. (The record of the total amount of radiation received by a worker is an important part of his work history.) Persons handling high-energy gamma sources may keep track of how their dosage is building up from hour to hour by means of a pocket ionization chamber, called a dosimeter,

[42] It will be remembered that radioactive substances differ in their characteristic half-lives. The "effective life" of a radioactive material may be up to three or four half-lives, depending on the way in which it is being applied.

[43] Radioactive sodium, for example, has a half-life of 15 hours. In a week its activity falls to less than one thousandth of its initial value, and after a second week to one millionth of this value.

which looks like a fountain pen. Most state safety codes require the use of such recording devices by working personnel who may be subject to dangerous amounts of radiation. Accurate development of film badges and accurate calibration of dosimeters is important; though even more important is the institution of plant techniques which embody large margins of safety.

Now for some illustrative examples of the way in which radioisotopes are proving of value in industry. (Appendix B, page 233, presents physical data for some radio-isotopes in common commercial use.)

Gaging

Where the thickness of sheets of a product—carbon paper, tin-plate, sheet aluminum, plastics, rubber, glass, and so on—must be closely controlled, a radioactive source and a detector can provide a simple method, based on the fact that the thicker the sheet, the fewer the radiations which will pass through it and be detected on the other side. For measuring thin films, paper, or plastic materials, beta particles may be suitable, while metal sheets up to several inches in thickness will require gamma rays. In many operations where the material to be measured is moving rapidly or at high temperature, or is soft, sticky, or easily marred, the source and the detector need not even be in contact with the material. Paint, glue, and other coatings may thus be measured to almost any desired thinness; and often a governor attached to the device automatically corrects any deviation from uniform thickness. Such measurements are an important part of the "quality control" and "process control" which is now an accepted part of modern technology.

Similar devices may measure the level of liquids in closed vessels, and automatically add fluids when needed.

A simple form of detector can measure the filling of packages of soap powder or of toothpaste tubes, by passing each packet between a source and a detector and, when the radiation recorded is above normal, automatically rejecting the empty or partly empty package. Such density measures also serve to indicate the ratio of steam or vapor to liquid in a pipe, or the tightness of pack of a cigarette.

An important use for oil companies involves the indication of the arrival at the end of a pipeline of a particular batch of fuel over hundreds of miles of pipe which may be used to transport a variety of fuels —gasoline, diesel oil, stove oil—through a single pipeline system. By marking the interfaces with an oil-soluble radioactive isotope and placing a Geiger counter or ionization chamber outside the pipe at the receiving end, a gradual change in density of as little as 1 per cent may be detected, and the time of arrival of the interface between two batches responded to promptly. A pen recorder may be coupled with the detector and an alarm system incorporated to give warning when the batch begins to change, whereupon the flow of X Oil to its tank may be automatically or manually cut off and Y Oil diverted to tank Y. Formerly hundreds of barrels of mixed oil had to be drawn off at each interface for reprocessing. A West Coast oil refiner estimates that the use of the radioactive marker saves around 150 barrels at a reprocess cost of $10 a barrel, or about $1500 for each interface.[44]

[44] This example (and many others) may be found in Corbin Allardice, ed., *Atomic Power: An Appraisal* (1957), p. 22-23.

Radiography

In X-radiography or gamma radiography, a source of rays throws a shadow of an object upon a sensitized plate or film encased in a light-tight container. If the object has an empty or thinly filled space in it, rays passing through this portion will show the position and size of the space by producing a lighter shadow. If some part of the material has a greater density than the surrounding areas, as when a foreign body is lodged in body tissue, the region of extra density will cast a deeper shadow. Radiography is thus a form of thickness gaging, only instead of detecting differences in overall thickness of an object, variations in its parts are revealed.

One of the earliest uses of radiography was in tracing the penetration of fertilizer through a growing plant. By putting radioactive phosphorus in a fertilizer and then laying a leaf of the plant against an X-ray film, one obtains a pattern of its distribution in the veins of the leaf, appearing as more heavily blackened portions.

Again, radioactive iodine may be fed to an animal and the position and the amount of the iodine taken up by the thyroid gland studied by taking a radiograph of a section of the animal's thyroid.

As another example, it is often imperative to detect corrosion in the walls of equipment like heat exchangers or pressure vessels without shutting down the plant. X-rays, radium capsules, or the gamma rays from radioactive isotopes may be used here, by placing a radiation source on one side of the metal to be tested and a photographic film below. The wall thickness may then be compared with the radiograph of a wall of standard thickness. Differences as slight as one one-hundreth of an inch may be detected by this technique.[45]

This not atypical advertisement in *Nucleonics* speaks for itself:

> By utilizing gamma radiation from a shielded Cobalt 60 source and a special scintillation detection system, Gammascan indicates thickness deviations within milliseconds—deviations as small as .001″ of steel. It can be linked with a chart recorder as well as servomechanisms for positive production control. One calibration allows 24 hours of continuous operation.[46]

Tracer Operations

The ease with which buried or inaccessible objects may be found with a detector has given rise to a wide variety of uses of radioisotopes. In these so-called "tracer operations," a bit of radioactive material emitting high-energy gamma rays is attached to the objects which are to be traced at a later state. Tracers can be used in such small quantities as to cause no serious increase in the size or weight of the labelled objects.

For example, in pneumatic-tube systems used to shunt documents from office to office documents sometimes become jammed in a tube. Papers are therefore enclosed in boxes to which a small radioactive source is attached. Cobalt 60 is often used for this purpose because it emits energetic gamma rays and has a half-life of more than five years. But the amount used for each carrier must be small enough (for ex-

[45] Corbin Allardice, *op. cit.*, p. 25.
[46] *Nucleonics*, November, 1958, p. 187.

ample, in the order of 15 microcuries, or 15 millionths of a curie) so that it can be handled without any shielding. Even so, if a large number of these boxes were stored together, a dangerous level of radioactivity would result. So a screen of lead or some other dense material should be placed between the source and the nearest operator, or the distance between the source and the operator increased. (Doubling the distance reduces the gamma rays to one-quarter intensity.)

Again, buried water or oil pipelines occasionally need to be scoured out. This is done by means of a "go-devil"—a revolving series of wire brushes mounted on a metal rod, which is forced along by hydraulic pressure, pushing the debris in front of it. The go-devil sometimes jams in the pipe, and formerly the only method of finding its whereabouts was to *listen* along the pipeline at a series of valve pits spaced some three miles apart. This was time-consuming and uncertain at best. Now, by attaching a source of cobalt 60 (about 200 millicuries is usual) to the go-devil, it can be detected through four feet of earth, by a man walking over the track of the line holding a Geiger counter close to the ground. If the track itself is not known accurately, a second operator may accompany him with a radiofrequency "mains finder." When the go-devil is located, and if attempts to move it by pressure fail, the pipe must be uncovered and cut. When no longer masked by four feet of earth, the position of the front and back of the go-devil can be found quite accurately and much wasteful excavation and cutting avoided. However, when the pipe has to be cut and manipulated in a narrow trench the danger to the men at work is obvious. To lessen this, the cobalt source is usually enclosed in a lead cylinder. When the go-devil jams, pressure on its cobalt source increases, forcing it out of the lead shielding, where its radiations can be more readily detected. After the go-devil is found, pressure is reduced to normal and a spring forces the source back into its lead case. Even so, it is necessary to watch the time when a man is working near it to see that his exposure stays within permissible limits.

A method for detecting underground leaks in electric conduits, developed by Detroit Edison Company, utilizes a trace of gaseous carbon 14 in nitrogen gas under pressure. Here the radioactive atoms themselves are to be traced. Holes are drilled along the line of the conduit and these are monitored periodically. If there is a leak, the amount of radioactive carbon in the sample will show the amount (size) and location of the leak. The method is sensitive, inexpensive and usable without interruption of service.[47]

Leaks in lined storage vats containing chemicals or other liquids may be detected if to the liquid is added a radioactive tracer of the same material, so that a leak may be traced even if it has traveled some distance from the crack in the vat lining before appearing on the outside concrete.

In some industries special materials added to bulk material must be thoroughly mixed. An ounce per ton is difficult to check for uniformity of distribution, and formerly the only means available was the costly and slow chemical analysis of samples. Now, however, a little radioactive isotope in the material to be mixed makes it possible to check

[47] Corbin Allardice, *op. cit.*, p. 28.

the samples for its presence by means of a detector, uniform radioactivity of the samples indicating uniform mixing. Mixing processes are likely to create dust, however, so particular care must be taken to note the proportion of airborne radioactive material and prevent it from being breathed by the operators. It is also necessary to use a very short-lived isotope, for example, radioactive manganese which falls to half-strength in two and a half hours.

Radiation Used to Modify Materials

This is a type of industrial use which is only beginning to show its potential value, but the oil, rubber and plastics industries are using radiation extensively to alter the character of the materials they are processing. "Polymerization"—the union of two or more molecules of a compound to form a more complex molecule—may be brought about by high-level radiation in plastics, rubber and other materials; and ordinary chemical processes may be induced more readily through irradiation. Much industrial research is under way in applications of high level radiation to industrial processing; approximately 100 establishments in the United States have installed irradiators in the kilocurie range for industrial research, according to recent AEC figures.[48]

These examples may suffice to indicate a few of the types of use possible, their typical dangers and the kind of protective devices required in an industry employing them. They are a tiny sample of the literally thousands of industrial and agricultural applications now in use. According to AEC's Dr. Willard F. Libby, addressing the UNESCO Conference on Radioisotopes in Paris in September 1957, American business firms were then saving between 312 million dollars and 500 million dollars a year, a total which he predicted would increase to 5 billion dollars annually within four or five years. He stated that about 51 percent of all the 1956 goods and services in America were sold by firms using radioisotopes in some fashion, predicted a rapid rise in the number of users and a still more rapid increase in savings per user.[49]

AGRICULTURAL USES OF ATOMIC ENERGY

Certain uses of isotopes and radiation in agriculture have already been suggested. In research they can contribute to studies of soil-plant relations, plant metabolism, crop improvement, and animal nutrition and metabolism. Besides this, they may be used to control blight and insect pests, inhibit sprouting in potatoes and onions, and control food-borne diseases like trichinosis. The use which is engaging most research talent and money at present, however, is that of food preservation through irradiation.

As early as the Geneva Conference in 1955, scientific papers were announcing that the decade of research just past had proved conclusively that food, pharmaceuticals and tissues might be adequately sterilized by ionizing radiations; although because of accompanying changes in flavor, color and texture, *preservation* rather than complete *sterilization* of foods would probably prove most desirable.

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[48] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 5.

[49] Atomic Industrial Forum, Inc., *Atomic Industry Reporter* 120 (September 18, 1957).

A U. S. Interdepartmental Committee on Radiation Preservation of Food, with membership from the offices of the Army, Departments of State, Agriculture, Commerce, Health, Education and Welfare, and the AEC, has been active since May, 1956. The Army Quartermaster Corps is interested in the military advantages of reducing refrigeration requirements in the field, increasing the amount of fresh foods in the combat man's diet, and preventing loss through spoilage; and the Army has spearheaded the research and development phase of food preservation through irradiation. But from an early stage the government has sought industry collaboration, which has been readily forthcoming.[50]

Evidence of the interdepartmental committee's optimism is given by the planned targets of achievement for this project, outlined in 1956 to the Joint Committee on Atomic Energy.

1956: Survey on 80 foods
Wholesomeness tests—human feeding tests
Inform American businessmen
Preliminary plans for Army Ionizing Radiation Center

1957: Begin construction of Army Ionizing Radiation Center
Research emphasis on 20 selected foods
Foreign trade fairs

1958: Packaging studies
Storage and handling studies
Limited troop taste testing
Army Ionizing Radiation Center in operation

1959: Pilot plant research on 20 foods
Pilot plant production on 10 foods
Industry assumes larger role

[50] According to information released in February, 1957, by a Stanford Research Institute private newsletter, the Army Quartermaster Radiation Planning Agency had cost contracts with the following industrial firms and other organizations participating in its food preservation program:

COST CONTRACTS

American Meat Institute Fndn.
Argonne Cancer Research Hospital
Columbia University
Cornell University
DeBell and Richardson, Inc.
Florida State University
General Electric
Lab. of Vitamin Technology
Mass. Institute of Technology
Mich. State University
Midwest Research Institute
National Canners Association
North American Aviation
Nuclear Science and Engineering Corp.
Ohio State University Research Fndn.
Olin Mathieson Chemical Corp.
Oregon State College
Penn. State University
Purdue University
Southern Research Institute
Southwest Research Institute
Stanford Research Institute
Syracuse University
University of California
University of Massachusetts
University of Michigan
U. S. Dept. of Agriculture
Utah State Agr. Experiment Station

NO-COST-TO-GOVERNMENT CONTRACTS

American Can
American Crystal Sugar Co.
American Institute of Baking
AMF Atomics, Inc.
Anaheim Cold Storage, Inc.
Armour & Co.
Basic Vegetable Products, Inc.
Continental Can
Cryovac Co.
Denver & Rio Grande RR Co.
Dewey and Almy
Doughnut Corp. of America
Glutamate Mfrs. Technical Com.
George A. Hormel & Co.
Kraft Foods Co.
Oscar Mayer & Co.
McCormick and Co., Inc.
John Morrell & Co.
Nestle Co., Inc.
Pepperidge Farm, Inc.
Charles Pfizer & Co., Inc.
Pillsbury Mills, Inc.
Quaker Oats Co.
Rath Packing Co.
Reliable Pkg. Co.
A. E. Staley Mfg. Co.
Swift & Co.
Whirlpool-Seeger Co.

The release also mentions that Southern Research Institute is conducting two studies for the army, to determine the protective properties of plastic packaging materials and their effect on food being irradiated.

1960: User acceptance clearance on some foods
Troop consumption experiments
Economic analysis for 10 foods, based on pilot plant production experience
Production by industry begins
(Army) procurement of few selected items begins[51]

The AEC's interest is in sources of gamma radiation; the Department of Health, Education and Welfare in food testing experimental procedures; the Department of Agriculture in microbiological studies on food products and other supplementary studies; the Department of State in U. S. Information Agency activities; and the Department of Commerce in industrial education and public information.[52]

The food irradiation program will need clearance by the Food and Drug Administration and the Surgeon General before foods can be processed in commercial plants, and the latter, at least, seems likely to be forthcoming. In 1956, the Surgeon General's Research and Development Division had this to report:

> The primary objective of the Surgeon General's program is to determine whether or not irradiated foods may be fed safely to humans. During the past year [1955-56] this program has been continued at 13 universities and privately sponsored research institutes and at the Medical Nutrition Laboratory, Fitzsimmons Army Hospital [in Denver, Colo.]. In the design of certain experimental phases of the program, the Food and Drug Administration of the Department of Health, Education and Welfare and the University of Chicago Statistical Research Group have aided materially by their advice and suggestions. The Meat Inspection Division of the U. S. Department of Agriculture has been apprised of the progress in the program.
>
> This broad program, designed to prove the safety characteristics of irradiated and preserved foods, has been directed through two major lines of approach: (a) potential toxicity and (b) nutritional adequacy of radiation sterilized and preserved foods.
>
> The * * * potential toxicity of irradiated foods may be further subdivided into three distinct phases: (a) toxicity as determined by short-term feeding experiments with experimental animals and human test subjects, and (b) obscure toxicity as detected by long-term feeding experiments, and (c) carcinogenicity as determined by tests on certain animal species. * * *
>
> The data thus far obtained from animal-feeding experiments do not indicate any significant production of toxic compounds by radiation sterilization or preservation. The subtle nature of the changes brought about by irradiation, however, requires the extension of these studies for longer feeding periods, in order to insure that [such] foods * * * may be safely consumed by human populations. * * *
>
> * * * preliminary results indicate no carcinogens formed or any tumor formation in the animals fed the treated diets.
>
> The nutritional properties of fats, protein, and carbohydrates that have been irradiated have been studied, and * * * the energy

[51] U. S. Congress. Joint Committee on Atomic Energy, *Development, Growth, and State of the Atomic Energy Industry;* statutory hearings, Section 202, Part 2 (of two parts), February 26 27, 28 and March 5, 1957 (85:1, 1957), p. 322.
[52] *Ibid.*, p. 344.

value of several meat, vegetable, and dairy products has remained unaltered. * * * The biological value of protein, a measure of the utilization of the protein, has also been found to be similar for nonirradiated and irradiated beef, lima bean and pea proteins * * * [that] of irradiated milk protein is slightly less than that of canned milk.

* * * some small losses in micronutrients and vitamins have been reported. Irradiation processing of foods apparently effects some destruction of fat-soluble vitamins [vitamins E and A]. The destruction of the water-soluble vitamins is, in general, not as great * * * as by heat treatment. * * *[53]

About a year and a half later, a representative of an industry participating in the Army's program told his fellow businessmen:

The major causes of food spoilage—micro-organisms and enzymes—[can be] destroyed by radiation and * * * food [will] keep indefinitely in the condition in which it emerges from treatment. * * * However * * * high energy radiations * * * also destroy biochemicals inherent in food itself which are responsible for characteristic nutrients, flavors, texture, and appearance. * * *

* * * over 100 university, independent and industrial laboratories are working in a research program under the U. S. Army Quartermaster Food and Container Institute * * * to develop "radio pasteurization" or radiation preservation—the use of low dosage radiations in conjunction with other methods of food preservation such as refrigeration. * * *

Three big stumbling blocks lie in the paths of manufacturers who would put radiation-pasteurized foods on the market. Despite the fact that extensive testing by analytical techniques and by animal and human feeding studies have shown no chronic or acute toxicity whatsoever, the Food and Drug Administration has not given its approval for the marketing of radiation-treated foods. This is understandable since the products of irradiation are virtually unknown and since each condition of irradiation leads to its own end products in each specific food. Thus, before any general approval can be given, each food must be completely tested to assure that no dangerous chemicals have been formed by irradiation. Results of basic research to date have indicated that high energy radiations often do create many compounds which are not theoretically predicted, some of which are complete unknowns.

The second great block is the equipment and equipment installations costs. * * * Even the large processors have been reluctant to invest upwards of half a million dollars to replace only one unit operation in their process. * * *

The final great block is acceptance by the American public. * * * A very careful program of publicity will be required to educate the public into acceptance of irradiated foods. * * * the use of refrigeration will be increased by the advent of commercially irradiated foods.[54]

[53] U. S. Congress. Joint Committee on Atomic Energy, *op. cit.*

[54] The President of California Packing Corp., Mr. R. G. Lucks, whose company is actively engaged in studies of radiation processing of fruit and vegetables, told his stockholders in September, 1957, that if and when radiation processing becomes commercially feasible, it probably will not require drastic changes in preparation and packaging procedures now in use.

> Literally thousands of competent research workers are spending their time in the area of research on radiation preservation * * * and it is rare * * * that such a concentrated effort of technical skills is denied results.[55]

MEDICAL AND PUBLIC HEALTH USES OF NUCLEAR ENERGY

The beneficial uses of radioactive materials for medical research, diagnosis, and therapy are legion, as earlier examples have suggested; and the benefits from careful medical uses may be assumed to outweigh the risks, particularly as research makes the effects of radiation better known.

Nevertheless, since the effects of radiation exposure are cumulative throughout a lifetime and since we are all exposed to a certain amount of unavoidable background radiation from cosmic rays, naturally occurring radioactive materials in our environments and in our bodies (to say nothing of the currently accelerating amounts from radioactive fallout in air, rain, snow, surface waters and foods), it is obvious that the employment of radiation for medical purposes should be carefully considered to eliminate all unnecessary use. This use is growing, however. According to a recent statement by the assistant director of the AEC Division of Industrial Development:

> Continued growth is expected in medical applications of radioisotopes, and greatly accelerated growth in industrial. Today there are, in the United States, about 227 teletherapy units,[56] containing from several hundred to 2,000 curies of cobalt 60, and in total, 250,000 curies. This growth is expected to continue. If a limit is reached, it will probably be caused by the limited number of competent radiotherapists, rather than by lack of need in medical therapy.[57]

The report of the United Nations Scientific Committee on the Effects of Atomic Radiation points out that while X-rays and radioisotopes give indispensable medical aid, the exposures per examination during diagnostic procedures could be considerably reduced without lessening their value, by methods recommended by the International Commission on Radiological Protection and by improving X-ray equipment. Further reductions in dose might result if the medical profession would reassess the circumstances under which X-ray diagnosis is called for, and if authorities which require X-ray examinations in the routine health surveillance of whole populations or of school children, students, employees, and others, undertook some kind of administrative co-ordination.

In particular, the genetic effects of ionizing radiations have become of deep concern, as exposures from bomb test fallout increase the probability of radiation-induced mutations which, it is accepted, are in

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[55] Atomic Industrial Forum, Inc., "Present Status of Radiation Preservation;" by Aaron L. Brody, *in Fourth Annual Conference Paper No. 57* (October, 1957).

[56] "Therapy" is the medical treatment of any disease. "Teletherapy" is a method of using a radioisotope as a radiation source in which the radioelement is shielded on all sides but one, thus giving a beam of radiation directed at the area to be treated.

[57] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 5.

general harmful and which increase in direct proportion to the genetically significant exposure, even at very low dose levels.[58]

Because physicians and health personnel themselves are dedicated to human welfare, the medical profession may be trusted, with a little urging, to do its own atomic regulation; but conflicts of interest are to be expected in connection with profitable industrial and commercial uses of these powerful new tools so that independent public agencies may always be required to help set and enforce standards for industrial nuclear practice.

There is considerable academic study of radioisotopes as tools in sanitary engineering, according to the McKinney Report. Spent fuel elements might be well fitted for sterilizing sewage, since the radiation source need not be of any specific kind. This may prove of interest to public health specialists. According to a June, 1956, report, the City of Los Angeles has had a project under way for some time, investigating the feasibility of using sewage as a reactor coolant, in order to sterilize it.[59]

RANGE OF COSTS OF ATOMIC ENERGY USES

In general, it costs in the millions of dollars to enter the atomic power business, while it is possible to make some use of radioisotopes, in medicine or industry, with a capital cost of as little as $1,000.

A survey made in 1955 showed that over 90 percent of the private industry investment in atomic energy occurred in companies with sales of over 100 million dollars per year, and that the average percentage of research and development funds devoted to the atom was less than 5 percent of their total budget.[60]

Dr. Chauncey Starr, General Manager of Atomics International, stated in February, 1957, that a company establishing an integrated atomic products manufacturing plant would require a capital investment of about $16,000,000.

The costs of atomic power plants may be expected to be greatly reduced over the next decade as the nuclear power industry passes out of the experimental stage, with its high research and development costs, into full commercial operation with experienced personnel. Chief cost factors involved, aside from heavy initial research and development expenses, according to one expert's account are

> the plant investment and its load factor, the cost of fabrication of fuel elements, the fuel inventory required, the "burnup" or amount of fuel that can be used before it must be regenerated by removal of the fission products, the cost of reprocessing the fuel, the value of the plutonium recovered, and the cost of waste disposal. * * * Decisive * * * is the type of reactor, and related to this the temperature of the steam produced * * * [for] the efficiency of the

[58] United Nations, *Report of the United Nations Scientific Committee on the Effects of Atomic Radiations*; General Assembly Official Records, Supplement No. 17 (Thirteenth Session, 1958), p. 15 and 34.

[59] B. C. Netschert and S. H. Schurr, *Atomic Energy Applications* (1957), p. 41-42.

[60] Atomic Industrial Forum, Inc., "Investing in Industrial Atomic Energy;" by Robert Le Baron, *in Proceedings* (September, 1955), p. 194-97.

> * * * turbo-generator plant, as distinguished from the reactor—depends largely on the temperature of the steam delivered to it by the reactor system. * * *[61]

The question of site or location of a nuclear power plant is of great economic moment. It may be expected that nuclear power companies will wish to place their plants as close to big industrial centers as possible, if economic factors alone are taken into consideration, while safety factors suggest the wisdom of locating nuclear facilities in isolation from large populations. Decisions on the balance of these factors may be expected to raise difficulties between communities and power companies, and indicate the desirability of independent surveys by technical committees cognizant of staff and local interests, as well as by AEC personnel.

To clarify the economics of the picture, Gerald Wendt may again be cited.

> In any power plant it is desirable to get a maximum return on the investment by keeping it at work as continuously and as long as possible. But when fuel and operating costs are small compared with the cost of capital (as with atomic energy power) the cost of standing idle or of partial operation is almost as great as the cost of full operation. For this reason, nuclear power cannot be considered where there is a large difference between the peakload and the average or minimum. In a power network the nuclear plant will carry the base load and other nonnuclear plants will be cut in as and when the power demand rises. The location of the nuclear plant with a view to load factor is therefore an important item in its economy. It is most likely to pay for itself in an industrial location where the power demand is nearly uniform during the 24 hours of the day.
>
> The cost of the land is also an important item in the capital cost. Until a few years ago it was feared that the danger of radioactive contamination of the surrounding area, and especially the danger of a "runaway" of the reactor, would require a large isolation area around the plant. In an industrial area this might have added $100 or more per kilowatt to the capital cost. But more recent designs * * * have reduced the hazard and the need of isolation. It is notable that the plants proposed under the Power Reactor Demonstration Program of the Atomic Energy Commission are located 30 to 50 miles from New York, Pittsburgh, Chicago, Detroit, Boston and Philadelphia, far enough to reduce land prices yet within the industrial area and without incurring the cost of long-distance transmission.[62]

In contrast to the requirements for entry into nuclear reactor field, hundreds of small industries may get into the radioisotopes business, with comparatively small investments. A table of approximate costs of various types of atomic energy businesses, prepared by B.C. Netschert and S. H. Schurr, presents pictorial data from which the following costs are taken:

[61] Gerald Wendt, *The Prospect of Nuclear Power and Technology* (1957), p. 134-36.
[62] Gerald Wendt, *op. cit.*, p. 144-45.

Table III

"COST SPECTRUM" OF ATOMIC ENERGY APPLICATIONS

(First Order Approximations) *

Medical radioisotope uses	$1,000- $40,000
Radiation gauges	4,000- 25,000
Isotopes for radiography uses	1,000- 11,000
Radioisotope research uses	1,000- 100,000
Subcritical facilities	55,000- 100,000
Small research reactors	65,000- 500,000
Pool and tank reactors	200,000- 1,500,000
Large research reactors	900,000- 2,250,000
"Radiation" reactors	850,000- 3,000,000
Small power reactors	1,500,000- 18,000,000
Engineering and materials testing reactors	6,000,000- 30,000,000
Large power reactors	18,000,000-100,000,000

* Ranges of costs cited in the literature with incomplete analysis of individual estimates. There is no direct comparability between categories in coverage and definition of costs bases, such as inclusion or exclusion of ancillary facilities.[63]

The New York State Department of Commerce has issued a booklet designed to encourage the use of radioisotopes by small businesses, which states:

> It is possible to start a testing program using atomic techniques for less than $1,000.
>
> It is possible to establish a small laboratory for $5,000 to $10,000. * * *
>
> Beyond the $10,000 figure, the costs can be set at almost any level the business feels it can afford. But for the purposes of this booklet, the top cost will be limited to $10,000.[64]

The booklet then outlines the training required for using radioisotopes, where they may be procured, how their use is regulated, and some of the applications which are possible at a cost of $10,000 or less.

We may appropriately close this chapter with a note on the implication of the economics of nuclear energy for the problems of state regulation and inspection of nuclear industry—a subject to which we shall devote more space in Chapter VII.

The scale of investment required for entry into the nuclear reactor business means that only a few reactors are likely to be located in any one state. From the point of view of the state and local burden of responsibility for safeguarding health and safety, this will partially offset the great potential damage which might result from a nuclear accident. But as the use of radioisotopes and radiations comes to embrace the great majority of industries in one form or another, the inspection program for these hundreds of establishments must become unworkable unless there is full industry co-operation, extensive education of plant managers, workers and the public, and vigilant enforcement of any reported delinquencies.

In addition, to quote again the Assistant Director of AEC's Division of Industrial Development:

> Perhaps the most important consideration that regulatory groups must meet will be the change in the type of persons handling radioisotopes as these move out of the hospital and research laboratory

[63] B. C. Netchert and S. H. Schurr, *op. cit.*, p. IX.
[64] New York. Department of Commerce, *Atomic Energy for Small Businesses* (1958), p. 5.

into industry. As thousands of separate radioisotope applications appear in industrial plants, it is inevitable that the persons most closely associated with them will be technicians and workers, of varying levels of education and with different degrees of specific training in radioisotope applications. Whereas, we may expect the operators and workers at a nuclear power reactor to possess and maintain a high degree of competence, this is not necessarily true of those who will be handling radioisotopes in all the many large and small industrial installations.[65]

From time to time, in this description of the nature of nuclear engineering and industry we have referred to activities of California firms. In the next chapter, however, we shall concentrate on the California picture.

[65] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 6.

CHAPTER III

NUCLEAR INDUSTRY IN CALIFORNIA[1]

California is a leading State in the use of nuclear energy. Major factors accounting for this have been, of course, Defense Department and Atomic Energy Commission expenditures on weapons-production, missile and spaceship programs, and military and civilian power reactor research and development programs.

ATOMIC ENERGY COMMISSION EXPENDITURES

The AEC San Francisco Operations Office Manager, speaking in March, 1958, before a management seminar on the economic potential of nuclear energy in this State, said that AEC expenditures in California for all purposes—plant, equipment, and operations—have totaled about $470 million, with a present annual rate of expenditure of about $100 million. Most of this money has gone to the Northern California area, especially to the University of California Radiation Laboratory. AEC employment in the laboratory has increased from 1,250 persons in 1944 to 4,600 in March, 1958. Currently, he said, about 50 fundamental research projects, in physics, chemistry, biology, medicine, agriculture, and metallurgy, are under way in the Bay area alone, being financed at the rate of about 1.5 million dollars per year.[2]

Growth is shown even since March, 1958, by end of year figures from the San Francisco Operations Office. These report expenditures running to about $130 million a year, on about 70 contracts—a few for construction, but the majority for operating contracts with the Lawrence Radiation Laboratory[3] at Livermore and Berkeley. About 8,500 persons are now directly employed by AEC and its contractors in this area—around 5,200 at UCLRL (3,350 at Livermore and 1,850 at Berkeley) and 2,200 at Atomics International. The remainder are at General Electric or General Dynamics, and there are a number of individual consultants. The AEC has about $74 million invested in plant and equipment at UCLRL, and about $10 million in other installations (not including Atomics International, which is administered from another AEC office and which has an AEC investment of at least $15 million.) About 60 fundamental research contracts are now in effect in this area with universities, hospitals, research organizations and industries, at an annual cost of about 5.5 million dollars.[4]

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[1] Mr. Ashton J. O'Donnell, manager of Nuclear Development for Stanford Research Institute; and several members of the staff of the AEC San Francisco Operations Office kindly read this chapter, contributing much useful information and many corrections of fact.

[2] AEC San Francisco Operations Office *Release* No. 125. March 13, 1958.

[3] In 1958, the University of California Radiation Laboratory was rechristened "The Ernest O. Lawrence Radiation Laboratory" in honor of its head, who died in that year.

[4] Figures given for March, 1958, and for December, 1958, are not strictly comparable. This is because the figures of $100 million in annual AEC expenditures for this area, and of 4,600 employed personnel, for March, 1958, did not include expenses and personnel entailed at Atomics International, which is administered by the Chicago Operations Office; while the figures of $130 million, and of 8,500 employed personnel for 1958 *does* include Atomics International.

Of the 19 major AEC research and development installations in the United States, three, or about one-sixth, are in California: the University of California Lawrence Radiation Laboratory in Berkeley and Livermore, the University of California Medical Center Radiation Laboratory in San Francisco, and the project at the University of California Medical School in Los Angeles. These three probably account for the biggest single block of atomic energy in the State. The California Institute of Technology in Pasadena is also a large participant.

MILITARY INSTALLATIONS

Undoubtedly the military installations in California represent a sizable sector of atomic energy use, but as the Department of Defense obtains reactors and special nuclear materials by presidential decree rather than through the AEC, the size of their operations is only conjectural. But the Naval Radiological Defense Laboratory at Hunters' Point in San Francisco is reputed to be the biggest military user in the State; and Mare Island Naval Shipyard is undoubtedly another major location of atomic energy sources and products. In addition, there are nuclear antiaircraft rockets and stores of nuclear munitions to arm them, probably concentrated around the Bay area, the Los Angeles area and along the coast.

CIVILIAN REACTORS

The Major Reactor Companies

Moving then to consideration of civilian applications of nuclear energy in California, foremost in rank in industrial use are its five major reactor companies—General Electric at San Jose and Vallecitos; Atomics International—a division of North American Aviation—at Canoga Park and Santa Susana; General Atomic—a division of General Dynamics Corp.—at San Diego; American Radiation and Standard Sanitary Corporation's atomic energy division at Mountain View; and Aerojet-General Nucleonics—a subsidiary of Aerojet-General Corp. wholly owned by General Tire and Rubber Co.—at San Ramon. Two reactors at these installations are producing power—at Vallecitos and at Santa Susana—the former feeding into Pacific Gas and Electric Co.'s commercial system, the latter into Southern California Edison's.

These five reactor-manufacturing companies represent a wide gamut of activity in nuclear industry.

General Dynamics, for example, has its California branch of Convair, which is working on nuclear propulsion of aircraft and doing research in reactor design; although most of this work is carried out at its Texas location. It also owns General Atomic (now employing from 600 to 700 persons at Torrey Pines Mesa) and in the eyes of many in the trade has shown the biggest vote of confidence in the future of nuclear industry, putting up "patient money" in building new types of reactors. It has completed designs for three research reactors: the TRIGA, a multipurpose, intermediate power, research reactor, designed for the custom production of radioisotopes as well as for training and research; the IRGA, a version of the TRIGA but with fewer reactor controls, designed primarily for industrial production of radioisotopes; and the REGA 10-30, another versatile research reactor. The company builds

its own fuel elements for TRIGA. It has consolidated the interests of eight western electric utility companies, the Rocky Mountain-Pacific Nuclear Power Group, in a two-year $500,000 program of research on a new reactor concept. It is also interested in marine propulsion, and has a major AEC contract to study a gas-cooled propulsion reactor for marine application. It has a $1 million contract with the Air Research and Development Command to study nuclear energy for space propulsion. It is seeking AEC support for research and development on a pioneer gas-cooled type of reactor costing $24.5 million, proposed to AEC in November, 1958, by a group of 50 companies (including P. G. & E.), joined in a group called the High Temperature Reactor Development Associates, Inc. The plant, to be engineered and built by Bechtel Corp., San Francisco, with Westinghouse Electric providing the electric generating system, would be located near Philadelphia.[5] One of Britain's engineers prominently engaged in the development and construction of the Calder Hall reactor, joined the General Atomic staff in 1957 as chief research and development engineer; and the company had the largest number of delegates of any company chosen by AEC to be at Geneva, a mark of high esteem.[6] A vice president of General Dynamics Corp., Frederic de Hoffmann, told the Joint Committee on Atomic Energy in February, 1958, that his company had given $1 million to the University of California to enlarge its San Diego facilities, with the hope that it would become a great technical center for university training in the sciences, and particularly in the technological sciences.[7]

In the Los Angeles area, North American Aviation has its division, Atomics International, another giant reactor company, employing over 2,000 persons at Canoga Park and Santa Susana, where it has $1.5 million worth of laboratories and offices. These include buildings for the Sodium Reactor Experiment, a $500,000 experimental facility for studying and testing reactor cores; a $240,000 organic laboratory, a $160,000 sodium laboratory, a special thermonuclear building and a linear accelerator building, besides those for administration and engineering. North American Aviation was the first private company in the United States to enter the nuclear business (1947) and has maintained a long-term look in its operations. It was the first to invest in a power-reactor test. It is a well-integrated organization, seeing its projects from the engineering-design-architect state to complete construction. (It goes outside for fuel elements, however, to Babcock & Wilcox and others.) Its test facility in the Santa Susana Mountains includes a sodium reactor experiment, prototype for the one it will build for Consumers Public Power of Nebraska. It is also conducting an organic moderator power reactor experiment for the AEC Idaho Testing Station; and has produced several low-power research reactors. It has had success

[5] *San Francisco Chronicle* (November 22, 1958).

[6] The TRIGA shown at the U. S. Govenment commercial exhibit at Geneva was purchased by the Governor-General of the Belgian Congo for the University of Lovanium, Leopoldville. The reactor's self-controlling safety feature holds any power level rise to a safe level by the negative temperature coefficient of its fuel element; accomplishing this by new fuel-moderator elements—an alloy of uranium-zirconium clad in aluminum. *Atomic Energy News*, 20:6, October 25, 1958.

[7] U. S. Congress. Joint Committee on Atomic Energy, *Development, Growth, and State of the Atomic Energy Industry*: Hearings, February 19-March 4, 1958 (85:2, 1958), p. 365.

selling these research reactors overseas (in 1957 to the AEC of Denmark and the Atomic Energy Research Institute of Japan; in 1958 to the Federal Republic of Germany and to the Institute for Nuclear Research of the City of West Berlin, and to the Milan Technical University in Italy),[8] and has been asked by Spain's *Junta de Energia Nuclear* to design a three-way reactor, producing both electricity and radioisotopes and serving as a test facility for fuel elements as well.[9] Atomics International has formed "Interatom," a jointly owned subsidiary, with *Demag*, one of West Germany's largest heavy manufacturers headquartered in Duisberg. It also has a technical assistance agreement with a prominent Swedish electrical firm, ASEA, with offices in over 50 countries.[10] It is one of the first American companies to keep a full-time representative in Geneva, to cover European nuclear prospects. North American Aviation has used Atomics International for some of the work of Rocketdyne, another of its divisions, on its "Project Rover"; and it has gone in for marine propulsion design also, primarily in organic reactors. It is also interested in food irradiation. Utilities in seven southwestern states selected Atomics International to study an advanced reactor concept (the Epithermal Thorium Reactor) under a $5.4 million four-year research and development program—a reactor type which they believe may produce electricity in their service area at a cost comparable with that obtainable from conventional fuels. The former manager of the AEC Chicago Operations Office, and before that of the San Francisco Operations Office, is now assistant to the general manager of Atomics International.

The third vast nuclear enterprise, General Electric Co., is a comparative newcomer to California, although it was the first company to be drawn into government's atomic power program, having been given a contract in 1946 by the Manhattan District to study "different designs of nuclear reactors for the generation of electric power."[11] In September, 1955, its vice president, and general manager of GE's Atomic Products Division, was introduced to an audience of atomic industrial leaders as

> responsible for a large national organization which includes: the Hanford Atomic Products Operation at Richland, Washington, which produces plutonium for the Nation's defense effort; the Knolls Atomic Power Laboratory at Schenectady, which is primarily concerned at the moment with the design and construction of submarine atomic power plants for the Navy; the Aircraft Nuclear Propulsion Department at Evendale, Ohio, which is working on the design and development of an atomic propulsion unit for aircraft; and the Atomic Power Equipment Department at Schenectady, for the design, development, manufacture and marketing of commercial atomic power and research equipment.[12]

[8] U. S. Atomic Energy Commission, *Twenty-fourth Semiannual Report* (July, 1958), p. 341.
[9] *Nucleonics* (October, 1958), p. 29. The reactor would be moderated by heavy water, organically cooled, and capable of tie-in to a 20,000 watt power generator.
[10] *Nucleonics*, Atomics International advertisement, (July, 1958).
[11] The American Assembly, *Atoms for Power: United States Policy in Atomic Energy Development* (1957), p. 48.
[12] Atomic Industrial Forum, Inc., *Proceedings* (September, 1955), p. 166.

This farflung enterprise, with 280,000 persons employed, is now in full swing at two enormous plants in the Bay area—its Atomic Power Equipment Department at San Jose and its great laboratory at Vallecitos, near Pleasanton in southern Alameda County. It is estimated to have from $25 million to $40 million invested in these two plants, and from 1,000 to 1,200 persons employed in atomic energy work. Its San Jose plant is headquarters for engineering and fabrication of many reactor components, including fuel elements, which can be tested and improved at its laboratory at Vallecitos—the first and largest privately financed atomic research facility in this country, with three nuclear test facilities, an experimental physics building, a radioactive materials building, and a materials testing reactor, the GETR.[13] The Vallecitos boiling water reactor, a part of this laboratory, has been in operation since October, 1957, turning nuclear energy into power through P. G. & E.'s adjoining turbine and generator. The test reactor—the country's first privately owned and financed one—produces no electric power, although its uranium core, lying under 30 feet of water, is capable of putting out 30,000 kilowatts of heat. Fifty-four simultaneous nuclear experiments can be carried out in the reactor, and one of the first uses to which it will be put is to test the components of the 50,000-kilowatt reactor GE is building for P. G. & E.'s Humboldt County installation. Fuel elements and many of the operating parts of this reactor will be fabricated at the San Jose plant, and tested and improved beforehand at Vallecitos,[14] as will the design, components, and fabrication of the 150,000-kilowatt power reactor for Italy's SENN (Societa Eletronucleare Nazionale), contract for which GE won in September, 1958, in a sales race which included many large American companies as well as one or more British and Italian firms. GE also has a contract for a 15,000-kilowatt boiling water reactor for a West German company, said to be the first nuclear power station in West Germany. General Electric has been very successful in the international market, operating through its organization "International General Electric," which maintains offices in many of the countries with which GE does business. It is thus familiar with local conditions and ready to do subcontracting with local firms. In 1958 it was building research and training reactors for the Institute of Neurology and Brain Research in Venezuela, the Nuclear Energy Board of Spain, and the National Tsing-Hua University in Taiwan.[15] Suisatom, S. A., an association of utilities in Switzerland, announced plans to purchase a 16,000-kilowatt reactor with General Electric supplying the design and nuclear components. General Electric offers irradiation space in its GETR to other industrial, educational, and research organizations, and is reported by AEC to be contractor for the 50,000-kilowatt engineering test reactor being planned for installation at Wadesboro, N. C., by Industrial Testing Reactors, Inc., a newly formed southern company.

[13] U. S. Congress. Joint Committee on Atomic Energy, *Development, Growth, and State of the Atomic Energy Industry;* Hearings, February 19-March 4, 1958 (85:2, 1958), p. 430.
[14] *San Francisco Chronicle* (January 18, 1959).
[15] U. S. Atomic Energy Commission, *Twenty-fourth Semiannual Report* (July, 1958), p. 343.

General Electric's plans for the future of nuclear power are definitely expansionist. In November, 1958, Vice President McCune proposed to utility and reactor companies meeting at Woodside, a three-phase program for the electric utilities of the Country, designed to bring nuclear electric generating costs to 8.5 mills by 1965 and to 6.5 mills by 1970. He suggested as the first phase the mass production of some 50 5,000-kilowatt nuclear power plants for operation by some 50 or more electric companies, at an installation cost of $4 to $4.5 million. General Electric would make and sell about 25 of its boiling water reactor plants, the utilities to buy 25 from other manufacturers. The main goal of this phase (called Operation Know-how) would be to help utilities train personnel and get acquainted with atomic operating problems. In the second phase, General Electric would sell to utilities, by 1962, at least four medium-sized nuclear power plants, ranging in price from $12.5 to $36 million, and totaling about $90 million. At a third stage, General Electric wants to build between 1962 and 1970 six very large plants at a total estimated cost of $400 million. Continued engineering improvements through these years, Mr. McCune believes, would bring about a reduction in electric generating costs by 1970 to 6.5 mills.[16] (Today, average costs with conventional fuels are about 7 mills.)

Two other smaller, but still sizeable, nuclear reactor companies are located in the Bay area: Aerojet-General Nucleonics at San Ramon near Walnut Creek in Contra Costa County, and American Radiator and Standard Sanitary Corporation, whose plant is at Mountain View in Santa Clara County.

Aerojet-General Nucleonics (AGN) is a young firm (founded in April, 1956); a subsidiary of Aerojet-General Corporation (California offices in Azusa), which in turn is owned by General Tire and Rubber Company of Akron, Ohio. AGN's specialty is the design and production on assembly-line basis of small reactors suitable for use in the classroom and for medical diagnosis, selling at about $100,000 apiece. It now employs 300 workers, did $6 million worth of business in 1958, and is putting up a new building, which will bring its total capital investment to $4 million. Its smallest research reactor, AGN-201, with a 20-watt output, was on display at the United Nations Conference at Geneva and was later sold to the University of Geneva; and a second model, AGN-211, was a showpiece at the World Fair in Brussels. The University of Palermo in Italy has purchased an AGN-211; and some 20 AGNs have been sold in the United States to universities and medical centers, while construction permits for about as many more have been issued by AEC. Many of the university purchases have been made possible through specific grants for the purpose made by AEC. General Tire and Rubber Company has donated one AGN reactor to the University of Akron.

Aerojet-General, the parent firm, is interested in nuclear marine propulsion and was one of two California firms (16 over the country as a whole) invited by the Maritime Administration to submit proposals for construction of a gas turbine propulsion system to be coupled with a nuclear reactor, suitable for use in Liberty ships. (The contract was awarded, however, to General Dynamics, whose General Atomic will

[16] *Atomic Energy Newsletter* 20:7, November 11, 1958, p. 2.

handle the work, expected to take from five to seven years.) Aerojet-General has a government contract to study the characteristics of high-speed underwater ship hulls for nuclear-powered submarine tankers; and was one of the five California companies to submit proposals to AEC in December, 1958, to provide services and facilities, and to perform research and development, for AEC's new Fuel Cycle Development Program aimed to improve the power reactor fuel cycle, from fabrication through use in the reactor, to removal, enrichment, and reuse. (The other four California firms are Atomics International, American-Standard, General Electric, and the Fluor Corporation, Ltd., of Los Angeles.)

American-Standard is not a small company, but it is one of the companies which went into the reactor business without being an AEC contractor, and as such has had hard going. As to its interests, its executive vice president in charge of operations testified before the Joint Committee on Atomic Energy:

> * * * Our corporation has for many years been a leading manufacturer of industrial equipment and, as such, we supply a significant amount of equipment each year to the power industry and to a number of atomic energy projects. When the government started its atoms-for-peace program in 1954, we examined our role in this field and determined that American-Standard could contribute significantly to it.
>
> A little over two years ago we formed an atomic energy division, which is now located in Mountain View, California. It is the objective of this division to design and construct atomic reactors, to manufacture special atomic equipment and to assist the other industrial product divisions of our corporation to produce the highly specialized atomic equipment that are normal extensions of our product lines (that is, condensers, heat exchangers, mechanical draft fans, boiler feed control, and fly-ash collectors).
>
> We manufacture, for example, nuclear heat exchangers, special nuclear valves, a full line of nuclear process instrumentation, fluid drives, and special air-and-gas-handling equipment. We are also constructing at Mountain View laboratories a nuclear training reactor designed and being offered for student training in colleges and universities. In addition, our atomic energy division staff has designed a new type of boiling water reactor, which, through simplification of basic design, we feel will go a long way in lowering power costs, and reducing the capital costs of nuclear power stations.
>
> Over the past two years our activities have grown and our present staff now numbers approximately 140. We have recently constructed a new engineering laboratory with a specialized manufacturing facility devoted exclusively to atomic energy work.
>
> American-Standard has built up its facilities and product designs in the atomic energy industry entirely on its own funds. * * * [17]

[17] U. S. Congress. Joint Committee on Atomic Energy, *Development, Growth, and State of the Atomic Energy Industry;* Hearings, February 19-March 4, 1958 (85:2, 1958), p. 208 ff.

American-Standard has sold one research reactor to Iowa State College, due for delivery in the fall of 1959. The firm was one of the subcontractors under Kaiser Engineers to assist in designing the reactor, which was at first planned as chief irradiation source for the Army's food irradiation project; but the contract was terminated when the decision was made in favor of a cobalt 60 source. The company is also interested in developing reactors for process heat and for maritime propulsion. It was selected by the AEC to make the study of the economic feasibility of nuclear-powered shipping, mentioned earlier—the most exhaustive investigation of this subject to date; and has recently received a $150,000 AEC award for study of a mercury-cooled reactor.

Central Station Power Reactors

In the early 1960's the State's first commercial power station, P.G.&E.'s 60,000-kilowatt installation in Humboldt County near Eureka, will be in operation; and P.G.&E. is reported to have planned for the construction by 1965 of at least one additional nuclear power station within the company's northern and central system, in an area where the cost of conventional fuels is high enough to allow nuclear power to compete. This projected plant will have a capacity of over 200,000 electric kilowatts.

Research and Training Reactors

Besides the research and training reactors mentioned in connection with the work of the reactor manufacturing companies, there are at least three in educational institutions—at the Naval Postgraduate School in Monterey, the University of California at Berkeley, and Stanford University.

A summary of this reactor-location information appears as Table IV on page 67.

LINEAR ACCELERATOR MANUFACTURERS

Applied Radiation Corporation of Walnut Creek (ARCO) is producing linear accelerators which are being sold widely over the country, as the following news notes in various trade journals attest:

> *May 29, 1958*—Applied Radiation Corp., Walnut Creek, has begun operations at the company's Midwest Irradiation Center at Rockford, Ill. The new Center, using an ARCO-manufactured electron linear accelerator, is operated by W. F. and John Barnes Co. It is available for commercial irradiation service, as is ARCO's Walnut Creek facility.
>
> *July 8, 1958*—Sale of a 40 MEV linear accelerator has been made by Applied Radiation Corp. of Walnut Creek, California. The machine will be installed in Yale University's accelerator laboratory in New Haven. Costing more than 1 million dollars, the high energy apparatus will be financed by the AEC.
>
> *November 30, 1958*—ARCO has sold the first Cockroft-Walton Accelerator produced commercially in the U. S. to the University of Arkansas for $70,000. It is a research tool and will not be used for industrial applications. ARCO is now manufacturing a 30 MEV accelerator that will be used in research con-

ducted at the General Atomic Division of General Dynamics, in Southern California. The price of the smallest linear manufactured by the company has been increased from $145,000 to $175,000.

Another California company in this business is Varian Associates of Palo Alto, which is building the electron linear accelerator for the Army's ionizing radiation center at Lathrop, California.

Table IV

NUMBER, TYPE, AND LOCATION OF NUCLEAR REACTORS AND CRITICAL FACILITIES IN CALIFORNIA

As of December 31, 1958 [18]

Type	*Number*	*Town*	*County*	*Owner*	*Subtotals*
Full-scale Power	1 (under construction)	Eureka	Humboldt	PG&E	*1*
Small	1	Vallecitos	Alameda	GE[19]	*2*
Power	1	Santa Susana	Los Angeles	AEC & S.Cal.Ed.	
Marine	5[20]	Mare Island	Solano	U.S. Navy	*6*
	1[21]	San Jose	Santa Clara	GE	
General Testing	1	Vallecitos	Alameda	GE	*1*
	(1) (planned)	San Ramon	Contra Costa	AGN	(plus 1 planned)
Specialized Testing	1	Vallecitos	Alameda	GE	*2*
	1	Santa Susana	Los Angeles	AEC	
Small Research and Training	1	Santa Susana	Los Angeles	AEC	
	2	Livermore	Alameda	AEC	
	1	Monterey	Monterey	U.S. Navy Postgraduate School	
	26[22] (9 more planned)	San Ramon	Contra Costa	AGN	
	1	Berkeley	Alameda	U of C	
	1 (plus 1 planned)	La Jolla	San Diego	GA	
	1	Canoga Park	Los Angeles	AI	
	1	Mountain View	Santa Clara	A-S	
	(1) (planned)	Stanford Univ.	San Mateo	Stanford U.	*34* (plus 11 planned)
Critical Assembly Facilities	1	Vallecitos	Alameda	GE	
	2	Livermore	Alameda	AEC	
	1	San Diego	San Diego	GA	*4*
Total					*46* (plus 12 planned)

[18] Information from reactor inspector, AEC San Francisco Operations Office, January, 1959.

[19] Components for three or four reactors are under way all the time at GE's San Jose plant, on subcontract for other companies.

[20] None of these were designed or built in California; they were merely installed here.

[21] The N. S. *Savannah* ship reactor core.

[22] Three of these, at most, are under way at any one time. The rest are sold or for sale throughout the nation and abroad.

ARCHITECT-ENGINEERING COMPANIES

Among the growing number of nuclear engineering and construction companies located in California a few stellar names stand out in the trade journals:

Bechtel Corporation of San Francisco, nationally and internationally known architect-engineers who have been engaged on a score or more of AEC contracts;

Holmes & Narver, Inc. of Los Angeles, prime AEC contractor for the Nevada and Pacific testing grounds, a firm specializing in shielding and construction to withstand blast effects; which designed and built the U.S. nuclear safety exhibit for display at Geneva in September 1958; made the hazards evaluation study of the Westinghouse test reactor in Pennsylvania; and another study with Lockheed Aircraft Corp. in Palo Alto, on the safety of reactors under the effects of earthquakes;

Kaiser Engineers, the atomic division of Henry J. Kaiser of Oakland, prime contractor for design and construction of the Engineering Test Reactor which recently went into operation at Arco, Idaho; and contractor or subcontractor for many other AEC projects including the contract to submit the design and construction schedule for a 40,000 kilowatt British-type, gas-cooled, graphite-moderated, natural uranium reactor;

Ralph M. Parsons of Los Angeles, engineering company which installed the reactor for GE at Vallecitos; will be the consulting engineer on the test reactor GE is building for Industrial Testing Reactors, Inc., at Wadesboro, N. C.; and is associated with many other GE projects in this country and abroad, as well as with other contractors;

Fluor Corporation, Ltd. of Los Angeles, frequently contractor and subcontractor for AEC; winner of the contract to make the California study on converting saline to fresh water by atomic energy, and of the contract to do the detailed engineering work on a $300,000 calcination system for the disposal of radioactive wastes at the AEC's National Reactor Testing Station in Idaho by concentrating liquid wastes into a dry material that can be stored in underground vaults lined with stainless steel; and

Diversified Builders, Inc. of Paramount, recently awarded the AEC contract of $3.6 million to construct the power plant and cooling tower for the second experimental breeder reactor at Arco, Idaho, and also to complete the reactor plant building.

This list is by no means a complete one, but it indicates that a constellation of talent and experience essential to reactor development exists in this area.

To this should be added a list of firms which engineer for some aspect of nuclear industry on a large scale: the aircraft companies such as Lockheed of Palo Alto and Sunnyvale; Douglas, Marquardt, and Hughes of Los Angeles; and Convair of San Diego. Lockheed plans to sell research and power reactors, concentrating its nuclear activities in its new Georgia Nuclear Laboratories; Hughes is interested in radiation effects and radiation propulsion; and the other companies do specialized

research and development in the nuclear field. A relative newcomer is Vard, Inc. of Pasadena, recently awarded a $400,000 contract by Westinghouse to produce control-rod mechanisms for submarine reactors—a company which is installing "hot test" facilities in anticipation of continuing in the naval reactor business. An old established firm, Byron-Jackson, of Los Angeles, subsidiary of Borg-Warner Co., advertised in a trade journal in September, 1955, "Manufacturer of pumps and mechanical seals for atomic power application, and of automatic control equipment—has either developed, engineered, manufactured, or handled as a complete project, pump equipment for every nuclear reactor in use in the U.S."

OTHER HIGH ENERGY SOURCES

The Assistant Director of AEC's Division of Industrial Development was quoted above [23] as saying that about 100 establishments in the United States have irradiators in the kilocurie range for industrial research. Examination of the list of those granted AEC byproducts licenses shows six—General Electric, McCullough Tool Co. of Los Angeles (specializing in oil-well logging and other types of radiography for oil companies), Aerojet-General, Hughes Aircraft, Stanford Research Institute, and Lockheed Aircraft—to have licenses to possess 1,000 curies or more of byproducts materials. When we add to this the 26 installations granted licenses to possess special nuclear material (GE, A-G and McCullough appear on both lists), we have at least a partial list of the installations capable of doing high-energy irradiation of materials.

We know too that linear accelerators such as are manufactured by Applied Radiation Corporation at Walnut Creek and Varian Associates of Palo Alto, and numerous other high energy machines such as Van de Graaff generators, betatrons, cyclotrons, and syncrotrons, used as particle accelerators, are being installed in universities and industrial research laboratories in California, where they are used for research, drug sterilization, materials-irradiation and other purposes. All these machines are capable of generating enormous dosages of radiation, and their sale and use is not controlled or supervised by AEC or any other agency.

There are also many industrial X-ray machines, and radium sources for industrial radiography or materials-irradiation in the State. The Division of Industrial Safety of the Department of Industrial Relations is presumably aware of the location of most of these.

Lastly there are the X-ray units and fluoroscopic units in hospitals, clinics, and the offices of doctors, dentists, veterinarians, radiologists, dermatologists, osteopaths, and chiropractors. Reliable data on their number is not available, but it is certain to include the large majority of this group.

MISCELLANEOUS RADIATION SOURCES

As an example of the variety of non-AEC-regulated sources of possible radiation to which California citizens may on occasion be exposed, we may quote from the list of some found by the Minnesota Atomic

[23] See page 50.

Development Problems Committee in their survey of the extent of radiation exposure of the State's population.

> Many devices operating at voltages in excess of about 15,000 volts can be sources of X-radiation. One recorded hazardous industrial projection type television tube * * * delivered radiation for a period of over a year at dose rates in excess of 100 milliroentgens per hour at a distance of about two feet. As this was the region occupied by the operator, this set was an important source of radiation for this individual.
>
> Electron microscopes, operating at 50,000 to 100,000 volts, likewise are sources of radiation, which can become dangerous. * * *
>
> Radium dial watches and instruments are, in many cases, sources of radiation of intensities many times background radiation. During the final years of World War II (1944-1945), radiation intensities in some of the aircraft were measured * * * at, or even greater than, the then recommended tolerance figure of 12.5 milliroentgens per hour.[24]

Static eliminators can also be the sources of radiation leaks, as can almost any sealed source equipment. Shoe-fitting fluoroscopy machines are a widely recognized source of unnecessary radiation. Many states have prohibited their use.

FURTHER INDICES OF THE EXTENT AND LOCATION OF NUCLEAR INDUSTRY IN CALIFORNIA

Number of Licensees in AEC San Francisco Operations Office Area

Something of the growth rate and the type of nuclear material used in the State's nuclear industry is shown by the number of byproduct, source, special nuclear, and nuclear reactor licensees within the area covered by the AEC San Francisco Operations Office. (This office has jurisdiction over Hawaii and Nevada, but these, according to the Inspection Division Director, account for well under 10 percent of the licenses issued within the office's area.)

In explanation of this table, it should be mentioned that the San Francisco Operations Office came into the inspection picture only in early 1957, receiving copies of licenses issued from Washington, D. C., for byproducts materials, but not, at first, for source materials, and not until early 1958 for special nuclear materials. License figures before these times are not available to us. In any case, AEC byproduct license figures are not comparable before and after February 10, 1956, since at that time the practice of requiring a firm operating at several locations to obtain a license for each location was discontinued, only one basic license being issued to a firm; and since, also, the amounts of byproduct materials coming under the general license was increased, with the result that many users no longer needed to apply for a specific license. For these reasons there was an apparent large drop in number of licenses issued in 1956 which did not reflect the true situation as regards atomic energy use.

[24] Minnesota. Atomic Development Problems Committee, *Basic Data Regarding Atomic Development Problems in Minnesota* (1958), p. 86.

Table V

AEC LICENSES WITHIN THE SAN FRANCISCO OPERATIONS OFFICE AREA [25]

April 11, 1957-December 31, 1958

	Byproduct materials	*Source materials*	*Special nuclear materials*	*Totals*
April 11-June 30, 1957	294	41	--	335
July 1-September 30, 1957	436	62	--	498
October 1-December 31, 1957	474	82	--	556
January 1-January 31, 1958	480	89	--	569
February 1-March 31, 1958	507	119	32	658
April 1-July 31, 1958	563	190	41	794
August 1-September 30, 1958	625	238	43	906
October 1-December 31, 1958	621	278	45	944

The data above indicate that for the year 1958, there was a 29 percent increase in the number of byproduct licenses, a 212 percent increase for source materials, a 35 percent increase for special nuclear materials,[26] and an increase for all types of license of about 66 percent.

For the *total* period covered above—April 11, 1957, to December 31, 1958—there was a 111 percent increase in byproduct materials licenses, and a 578 percent increase in source material licenses.

Total increase for all types of licenses for which the San Francisco Operations Office has records from April 11, 1957 to December 31, 1958, was 182 percent.

Number of Shipments of Byproduct Materials

The number of shipments of radioactive isotopes from AEC to California users provides another index of the size of the nuclear energy program here. From February 10, 1956, to November 30, 1958, shipments went to 422 users, many of whom utilized these at several locations. This represented roughly one-tenth of the national AEC distribution, namely 422 out of 4,424 users. The largest number of shipments went to doctors and medical institutions, next largest to industrial firms; but in quantities of curies represented, industrial use far outweighs medical use. The breakdown by type of user is given below:

Table VI

TOTAL SHIPMENTS OF BYPRODUCT MATERIALS BY AEC [27]

February 10, 1956-November 30, 1958

	Medical institutes and physicians	*Colleges and universities*	*Ind'l. firms*	*Fed. and state labs.*	*Fndns. and institutes*	*Other*	*Total*
California	197	10	173	33	3	6	422
Whole Nation	1,954	260	1,463	639	49	61	4,424

[25] Figures obtained from the Inspection Division, AEC San Francisco Operations Office, Richard W. Smith, Director. January 15, 1959.

For the 1958 period, the number of byproduct materials licenses outside California (in Nevada, Hawaii, and Pacific Isles) was 49; of source materials licenses 5. These figures are included in those given above.

The total number of byproduct materials users in California from February 10, 1956 to November 30, 1957, was 334, when the changes mentioned above occurred.

[26] Percent increase for special nuclear materials represents only period from March 31, 1958 to December 31, 1958.

[27] Data from: U. S. Atomic Energy Commission, *Twenty-fifth Semiannual Report* (January, 1959).

AEC Licensees by County and Type of License

A further useful index of the extent and type of use of AEC licensed material is provided by the California Department of Public Health, Bureau of Adult Health, a compilation of data taken from AEC license information. This lists AEC licensees by their location in California health jurisdictions (counties and some cities) and by types under the following headings: nuclear reactors currently licensed; source material licensees; special nuclear material licensees; and byproduct material licensees—the last-named further classified into industrial, educational, governmental and medical installations, installations which process these materials for redistribution, and installations licensed to store and dispose of byproduct waste material. Figures for each of these categories, as of July 1, 1958, are presented below.

Nuclear Reactor Licensees. According to this Public Health Department compilation, as of July 1, 1958, there were 29 licenses for non-AEC-owned nuclear reactors in California in seven different locations—at Berkeley, Vallecitos, San Ramon, Canoga Park, Monterey, Torrey Pines Mesa, and Mountain View. General Electric has 3 licenses, Aerojet-General 3, Aerojet-General Nucleonics 17, and General Dynamics 2; while the University of California, Atomics International, Naval Postgraduate School, and American-Standard each have one. These figures do not of course include reactor experiments being conducted for AEC at Santa Susana and Livermore, nor the submarine reactors being installed for the Navy at Mare Island.[28]

Source Material Licensees. As for source materials, there were 160 licensees distributed through 16 counties. Thirteen were miners, who were granted the right to handle and transfer raw uranium or thorium from mining claims. The great bulk of the remainder—97—were in Los Angeles County. They include reactor companies; electronics, aircraft, engineering, chemical, and a variety of other manufacturing companies; colleges; and testing and industrial laboratories.

Otherwise, source material licenses were scattered as follows:

In Alameda County

Berkeley
- University of California
- C & H Machine & Engineering Co.

Oakland
- Hales Testing Laboratories
- Kaiser Aluminum & Chemical Corp.
- Pacific Industrial X-ray Corp.
- Stainless Polishing Corp.

San Leandro
- Kaiser Aircraft & Electronics

Sunol
- General Electric Co.
- Vallecitos Atomic Laboratory

In Contra Costa County

Richmond
- Kaiser Aircraft & Electronics
- Tracerlab, Inc.

San Ramon
- Aerojet-General Corp.
- Aerojet-General Nucleonics

In San Diego County

Chula Vista
- Haltermann-Stark & Co.

National City
- National Plating & Processing Co.

San Diego
- General Atomic
- San Diego State College

Santee
- Chem-Tronics, Inc.

In San Francisco City and County

- Acme Legal Service
- Braun-Knecht-Heimann Co.
- Hanks, Abbot A., Inc.

[28] This figure will give the wrong impression if it is taken to mean that there are 29 *operating* reactors in California. Aerojet-General Nucleonics has three at the most being built at any one time, although it has 17 licensed to build.

In San Mateo County
- Belmont
  - Dalmo Victor Co.
  - Western Gold & Platinum Co.
- Burlingame
  - X-ray Engineering Co.
- Menlo Park
  - Cook Research Laboratories
  - Stanford Research Institute
- Redwood City
  - Chemical Process Co.
  - Equipment Supply Co.
- San Carlos
  - Sequoia Metalcraft Co., Inc.
  - Sevardia Manufacturing Co.

In Santa Barbara County
- Penta Laboratories, Inc.

In Santa Clara County
- Mountain View
  - American-Standard
  - Sylvania Electric Products, Inc.
- Palo Alto
  - Hiller Helicopters
  - Precision Tool & Grinding Co., Inc.
- Permanente
  - Kaiser Aluminum & Chemical Corp.

It is obvious from this data that source materials users are concentrated in the Los Angeles area (97 licensees) and the industrialized Bay area counties (32 licensees).

Special Nuclear Materials Licensees. There were 31 licensees entitled to possess special nuclear materials (enriched uranium and plutonium), distributed through 10 counties, as of July 1, 1958.

In Alameda County
- Berkeley
  - University of California
- Sunol
  - General Electric at Vallecitos

In Contra Costa County
- Martinez
  - Shell Oil Co.
- Richmond
  - Tracerlab, Inc.
- San Ramon
  - Aerojet-General Nucleonics
- Walnut Creek
  - Applied Radiation Corp.
  - Nuclear Engineering Co., Inc.

In Los Angeles County
- Los Angeles
  - McCullough Tool Co.
  - Atomics International
  - Occidental College
  - University of California
- Pasadena
  - California Institute of Technology
  - Consolidated Electrodynamics Corp.
- Rest of County
  - Aerojet-General (Azusa)
  - Amer. Electronics, Inc. (Culver City)
  - Applied Research Labs. (Glendale)
- Riverside
  - University of California

In San Diego County
- La Jolla
  - Scripps Institution of Oceanography
- San Diego
  - General Atomic
  - General Dynamics
  - San Diego State College

In San Francisco City and County
- Univ. of Cal. Medical Center
- Naval Radiological Defense Lab.

In San Mateo County
- Stanford Research Institute

In Santa Barbara County
- Santa Barbara College

In Santa Clara County
- American-Standard (Mt. View)
- General Electric (San Jose)
- Lick Observatory (Mt. Hamilton)
- Lockheed Aircraft (Palo Alto)
- Stanford University (Stanford)

In Yolo County
- University of California at Davis

BYPRODUCTS MATERIALS LICENSEES. California's 420 byproducts materials licensees as of July 1, 1958, included 204 medical and hospital users, 150 industrial users, 20 educational institutions, 20 governmental institutions, and 21 reprocessers for resale. These were distributed through 32 counties, those having the largest figures being Los Angeles,

175; Alameda, 38; San Francisco, 25; San Diego, 23; Contra Costa, 19; and Santa Clara, 21. Most installations have separate licenses for many different kinds of isotopes. The amount in curies is not indicated by the figures given above, but appears in the Public Health Department data.

WASTE DISPOSAL LICENSEES. Two firms have licenses to collect, package, and dump at sea radioactive wastes: Isotopes Specialty Company in Burbank, whose maximum possession limit at any one time is 100 c of byproduct material and 2000 lbs of contained source material; and Nuclear Engineering Company, Inc., in Walnut Creek, which can possess 100 c of byproduct and source material and 2 g of special nuclear material at any one time, packaging and storing at the Cowell Cement Plant nearby, but disposing at sea. (In February, AEC announced plan to license Coastwise Marine Disposal Co. of Los Angeles to dispose of radioactive wastes in the Pacific. *San Francisco Chronicle,* Feb. 26, 1959.)

Table VII

AEC LICENSES IN CALIFORNIA BY TYPE AND COUNTY AS OF JULY 1, 1958 *

County	Nucl. react.	Source mater. †	Spec. nucl. mat. ‡	Byproduct Materials §					Waste disp. and stor.	Total
				Med. and hosp.	Ind'l.	Ed'l.	Govt'l.	For reproc-ess		
Alameda	4	9	--	14	19	1	1	3	1	52
Butte	--	--	--	1	--	1	--	--	--	2
Contra Costa	20	4	7	4	13	--	--	2	2	52
Fresno	--	2	--	8	--	--	--	--	--	10
Humboldt	--	--	--	2	--	--	--	--	--	2
Imperial	--	--	--	2	--	--	1	--	--	3
Kern	--	2	--	4	7	--	2	--	--	15
Kings	--	--	--	1	--	--	--	--	--	1
Lassen	--	1	--	--	--	--	--	--	--	1
Los Angeles	1	97	10	89	60	5	7	14	2	285
Marin	--	--	--	2	--	--	--	--	--	2
Mendocino	--	--	--	--	1	--	--	--	--	1
Monterey	1	--	--	3	--	--	--	--	--	4
Napa	--	--	--	1	1	--	--	--	--	2
Orange	--	--	--	7	7	1	1	--	--	16
Riverside	--	3	1	1	--	1	1	--	--	7
Sacramento	--	--	--	3	4	--	3	--	--	10
San Benito	--	--	--	--	--	1	--	--	--	1
San Bernardino	--	6	--	4	3	--	--	--	--	13
San Diego	2	5	5	13	6	3	1	--	--	35
San Francisco	--	3	2	14	6	1	2	2	--	30
San Joaquin	--	--	--	1	3	1	--	--	--	5
San Luis Obispo	--	1	--	2	--	1	--	--	--	4
San Mateo	--	9	1	3	4	--	--	--	--	17
Santa Barbara	--	1	1	4	1	1	--	--	--	8
Santa Clara	1	9	12	9	10	2	--	--	--	43
Santa Cruz	--	--	--	2	--	--	--	--	--	2
Shasta	--	--	--	1	--	--	--	--	--	1
Sierra	--	2	--	--	--	--	--	--	--	2
Solano	--	1	--	1	--	--	--	--	--	2
Sonoma	--	--	--	3	1	--	1	--	--	5
Stanislaus	--	--	--	2	1	--	--	--	--	3
Tulare	--	--	--	2	--	1	--	--	--	3
Ventura	--	--	--	1	2	--	--	--	--	3
Yolo	--	--	1	--	--	1	--	--	--	2
Totals	29	155	40	204	150	20	20	21	5	644

* From data published by the California Department of Public Health, Bureau of Adult Health.
† Thirteen of these represent licenses to transfer raw source material from mining claims.
‡ Four of these licenses permit possession and use at several locations within the United States.
§ Most installations have separate licenses for many different kinds of isotopes. The amount in curies is not indicated by this data.

A third firm, Atomic Energy Waste Disposal Service of Oakland, has license to collect, package, and store at any one time, at a site in Nevada County near Colfax, 1 c of byproduct and source material waste. It is not authorized for disposal.

Tracerlab, Inc., in Richmond, is licensed to package and store radioactive wastes resulting from its own operations, not to exceed 10 c at a time; and American Electronics, Inc., the Nuclear Division of Reed-Curtis Company, in Culver City, can collect, store, and dispose of byproduct and source material, up to 10 c total.[29]

AEC Access Permits

Still another way of getting at current interest and activity in nuclear industry in California is by noting the companies which have access permits to AEC information materials. This is a less useful indication than formerly, since much material formerly available only to permittees is now being published, and since some companies, having long had access in the past, are no longer so dependent upon AEC for technical information. Nevertheless, it is suggestive of the areas in which research into new uses is going forward.

The San Francisco Operations Office of AEC had granted 148 access permits, as of September 30, 1958, 114 of which were in California, the remainder out of the State. Permits were granted to 38 individuals, 95 corporations (two of these being colleges), six sole proprietors, three partnerships, and six governmental institutions. Again this represents about one-tenth of the total number for the country—148 out of 1,417 permit holders.

The list of types of businesses represented may indicate areas of currently expanding nuclear interest to state users. AEC has classified permit-users into 24 types.[30] (The numbers following each classification represent number of permits granted in that class.)

Aircraft and/or components	12	Instrument manufacture	8
Machinery—general	3	Research—general	6
Machinery—special	5	Insurance companies	3
Metal products manufacture	4	Lawyers and public accountants	1
Waste disposal	2	Consultants	20
Shipbuilding and/or components	4	Educational institutions	2
Weapons, explosives, and propellants	2	Federal, state, and city governments or departments	3
Chemical—general	8	Information services	2
Chemical—processing equipment	1	Printing and publishing	1
Petroleum and petroleum products	2	Engineering—construction	8
Stone, glass, and clay products	3	Engineering—design	8
Electronic industry	12	Utilities	15[31]

Stanford Research Institute Study

In 1956 SRI, in an unpublished study, attempted to estimate the extent and nature of atomic energy activity in northern California

[29] A table showing number and type of AEC licenses by California counties is given on page 74.

[30] Seven permit holders had permits under two or more headings.

[31] Utilities permits went to eight out-of-state power companies, all members of the Rocky Mountain-Pacific Nuclear Research Group for which General Atomic is conducting a two-year study, at a cost of more than $500,000, directed to high-temperature, gas-cooled reactors and to the possibility of converting heat directly to electricity.

alone, and to forecast nuclear activity for January 1, 1958. These estimates are believed by an informed spokesman for the Institute to have been not far of the mark. Because the survey took account only of the northern half of the State, it is not directly comparable with other figures given in this section, but the activities centering around the University of California Radiation Laboratory probably mean that that it amounts to more than half of the total state activity.

The SRI study estimated that about 11,000 staff—nuclear and supporting—would be employed in January, 1958, about 2,000 of them in engineering-construction.

Level of activity in dollars, as measured by sales, was estimated at about $82 million.

Investment, excluding the investment in the Lawrence Radiation Laboratory and three submarines at $50 million each, would probably be about $42 million.

In 1956 atomic energy industries in northern California were found to comprise 93 companies or organizations, of which 34 were engaged in research and development and/or manufacturing and engineering, 46 were users of radioisotopes and radiation, four were reprocessors of radioisotopes, 17 were AEC contractors or subcontractors, and eight were consultants. (Some companies appear in more than one category.)

At that time there were 13 accelerators in northern California, with an estimated 15-30 by January, 1958; and three reactors located at two reactor organizations. Seven organizations were expected to be selling or possessing reactors by January, 1958.

The chief types of nuclear activity found were divided into "military" and "civilian." The former comprised: making fission and fusion weapons, and building nuclear submarines, aircraft, and rockets. Civilian activity comprised: designing and building power reactors, and research and other low-power reactors, some for international export; instrument manufacture; fuel element fabrication; manufacturing special high temperature materials; and engaging in applied industrial research, biological and medical research and therapy, food sterilization, and radiation chemistry with the latest elements.

There were four radioisotope reprocessors in the area in 1956: Bio-Rad Laboratories and Research Specialties, Berkeley; Edgar A. Edelsack, San Bruno; and Union Oil Company, Contra Costa County.

Important AEC licensees were:

American-Standard, Redwood City
Applied Radiation Corp., Walnut Creek
California Research Corp., Richmond
General Electric, San Jose
Lockheed Aircraft Corp., Palo Alto
Aerojet-General Nucleonics, San Ramon
Radiation Detection Co., Palo Alto
Shell Development Co., Emeryville
Stanford Research Institute, Menlo Park
Stanford University, Palo Alto
Tracerlab, San Pablo
U. S. Navy Radiological Defense Laboratory, San Francisco
University of California at Berkeley, Davis, Medical Center in San Francisco, and Livermore

Important AEC contractors or subcontractors in Northern California were:

Applied Radiation Corp., Walnut Creek
Bechtel Corp., San Francisco
Cal. Research Corp., Richmond
Food Machinery & Chemical Corp., Oakland
Kaiser Engineers, Oakland
Arthur D. Little, Inc., San Francisco
Lockheed Aircraft Corp., Palo Alto
Precision Technology, Inc., Livermore
Pratt & Whitney, Livermore
Sandia Corp., Livermore
Stanford Research Institute, Menlo Park
Stanford University, Palo Alto
Tracerlab, San Pablo
U. S. Army Ionizing Radiation Center, Lathrop
University of California at Berkeley, Davis, Livermore

Government agencies in Northern California concerned with supervision of atomic energy activity in 1956 were: the State Department of Health, State Division of Public Safety, AEC Division of Licensing and Regulation, and AEC San Francisco Operations Office.

Service organizations with interests in the field were: banks, investment companies, insurance companies and blueprint companies.

Classified as having miscellaneous interests in the field were: maritime companies, magazines for the trade, and engineering and construction companies.

"Buyers' Guide" List of Atomic Energy Industries

Still another source of information is the November issue of *Nucleonics* which annually features a buyers' guide for the coming year, listing atomic energy industries over the whole country. A check of the November, 1958, issue suggests California's strong position relative to the rest of the county. It shows that:

Of 26 companies in the whole country listed as manufacturing accelerators, 11, or almost half, are in California.

Of 39 American companies manufacturing nuclear power plants, 8, or about one-fifth, are in California.

Of 47 American companies selling reactors (including critical assemblies, reactors for isotope production, materials-testing, power, research and training), 13, or a bit under one-third, are in California.

Of 16 American companies manufacturing gamma-ray radiographic equipment, 5, or about one-third, are in California.

Of 12 companies offering irradiation services by accelerators, 5, or almost half, are in California.

Of 131 companies offering consulting services to nuclear industries, 23, or about one-sixth, are in California.

Of 41 American companies offering health physics organization and procedure, 9, or a little over one-fifth, are in California.

Of 22 companies specializing in decontamination services (including waste disposal), 7, or about one-third, are in California.

There were a total of 197 California companies listed in the November, 1958, Buyers' Guide, as against 187 the year before. This net gain of 10, however, represented 49 new listings balancing 39 listings which had disappeared.[32]

[32] *Nucleonics*, Vol. 16 (November, 1958), p. D1-D100.

CALIFORNIA AND THE ARMY'S FOOD IRRADIATION PROJECT

The Army's Ionizing Radiation Center is located at Sharpe General Depot, Lathrop, near Stockton, with Ralph M. Parsons Co. as major subcontractor. It will use as radiation source 2,000,000 curies of cobalt 60, to be obtained from the AEC's Savannah River Plant Reactors at Aiken, South Carolina. When construction of the project is completed in mid-1960 at a cost of about two million dollars (exclusive of the cobalt source which, at May, 1958 prices, might be valued anywhere from three million dollars to seven million dollars depending on curie per gram activity), it will be turned over to the Army Quartermaster Corps which will operate it in large-scale food irradiation, through contract with an industrial group.

Irradiated Products, Inc.—a group formed in 1957 by Food Machinery & Chemical Corp. of California, Armour & Co. of Chicago, Continental Can Corp. of New York, and General Foods Corp. of New York —was awarded the contract for production planning for the center; and Varian Associates, American-Standard, and Stanford Research Institute were given subcontracts to assist in certain of the planning phases. A large-scale linear accelerator to produce beta radiation for the center is under construction at Varian Associates, supplementing the gamma radiation of the cobalt source.

A spokesman for one of the subcontractors, in a private interview given in October, 1958, predicted that irradiated foods will come into the commercial picture as follows:

> If the tests at Fitzsimons Hospital are favorable, healthwise and acceptance-wise; and if the tests at Stockton demonstrate economic feasibility and edibility, then the Quartermaster Corps will place orders for large quantities of food for forward bases over the world, just as they did in first trying out frozen foods.
>
> If the foods are accepted as palatable, the private companies which will have been making these foods will get orders on government contracts, and when the time comes will try them out in small test areas. This will probably take from three to five years. The companies in Irradiated Products, Inc. will of course be in a preferred position for this business.
>
> Before this, the public will have become accustomed to irradiated drugs. (An eye ointment now on the market is irradiated from a Van de Graaff machine.)
>
> Irradiated food pasteurization will help California. The State can send its agricultural perishables all over the world. But there is a possibility we should not overlook: some countries may leap entirely over the frozen food stage into food irradiation and be exporting to us before we get around to using irradiation extensively in this country. France's "Conservatom" is being watched by food processing companies in that country and here; and Japan too may get ahead of us in this. However, ultimate approval of either domestic or foreign irradiated foods will rest with the U. S. Food and Drug Administration, whose standards are very severe.

A note of warning on the problems which may be raised by this and other agricultural uses of atomic energy may, however, deserve attention. The McKinney panel of experts, writing on the impact of farm uses of atomic energy on the American economy, pointed out:

> To the individual farmer all this (e.g., atomic applications to plant breeding so that we can tailor crops to special conditions, control blight and pests, and store crops without deterioration) may mean larger and better crops. For the consumer it may mean lower prices.
>
> But for the nation as a whole, these improvements seem likely to intensify the already serious surplus problem. Although our population is growing and living longer these factors alone will not even absorb our present surpluses. * * *
>
> Foreign markets offer no solution to U. S. farm surpluses. United States tariffs and low foreign buying power restrict world trade in farm produce. Dumping of surpluses abroad upsets foreign economies. Giving food away free is no answer; resistance is too great from local economic interests. And "free" foodstuffs are not free; it costs money to transport them.
>
> But we can export our experience and technology in atomic energy for agriculture.
>
> * * * Abroad, however, it means only one thing: the possibility that teeming masses abroad may at last get enough to eat. * * *
>
> Herein lies a significant challenge to United States leadership in the free world.[33]

In closing, we may conjecture that California may be on the threshold of an even more rapid expansion of its reactor business—the major facet of nuclear industry. To the glowing prospect outlined by the vice president of GE (still only in the proposal stage) must be added whatever plans for the future are brewing in AI, GA, AGN and A-S companies, each of which is busy developing a market for export as well as engaging in ambitious studies and designs for new types of reactor concepts with due encouragement from AEC and from interested utilities in many parts of the country.

When we add to the reactor business its cluster of auxiliary industries, the lengthening roster of radioisotope users, the head start and the geographically enticing conditions here, it seems highly probable that California will maintain its present unchallenged position as western nuclear capital of the United States.

[33] U. S. Congress. Joint Congressional Committee on Atomic Energy. Panel on the Impact of the Peaceful Uses of Atomic Energy, *The Peaceful Uses of Atomic Energy; Digest of Report* (January 30, 1956), p. 33-34.

CHAPTER IV

NUCLEAR ENERGY AND GOVERNMENTAL INSTITUTIONS [1]

In considering the need for possible state control or development of nuclear energy, it is well to recognize that perhaps few American industries sustain relationships with government as complex as those of atomic energy users.

Foremost among the government agencies with which industry has to deal is the Atomic Energy Commission, but there are from 15 to 20 other government bureaus or departments with some type of responsibility over the private use of atomic energy.

As is well known, nuclear energy technologies were first developed in connection with the production of weapons. The Army's Manhattan Engineer District carried forward atomic research looking primarily toward military applications until shortly after Congress passed the 1946 Atomic Energy Act setting up a civilian agency to administer the program.

THE ATOMIC ENERGY COMMISSION

Organization and Personnel

Since 1947 the Atomic Energy Commission, headed by five commissioners whose chairman acts as spokesman, has been the major institution in the nuclear energy program. Its complicated functions include weapons-producing, policy-making, developing and encouraging private atomic industry, and licensing and regulating such industry in the interests of national security and of protecting health and safety.

Businessmen seeking contracts with the AEC, or applying to them for licenses of various sorts, have to become familiar with its rather ramified and changing structure.

In late 1958, the principal staff of the Washington office of the AEC [2] consisted of a general manager, a deputy manager, five assistant general managers, and 16 division directors. The commission has its own controller, general counsel, and secretary.

Twelve field operations offices located near major AEC projects perform the actual supervision of contracts for research and development, production, and construction, their managers reporting to the program divisions in Washington. Recently these offices have been given responsibility for administering the access permit program [3] and other civilian service activities formerly centralized at federal headquarters.

[1] Chief sources for the data on the U. S. Atomic Energy Commission are its semiannual reports; its publication *Atomic Energy Facts* (1957); and a speech by James T. Ramey, executive director of the Joint Committee on Atomic Energy, entitled "Atomic Energy and Government Institutions," published in Atomic Industrial Forum, Inc., *Forum Report*, no. 12, v. 1, 1956. Members of the AEC San Francisco Operations Office were good enough to read and criticize the first section of this chapter.

[2] This office is now located at Germantown, Maryland, 27 miles north of the Capitol.

[3] Permits for access to classified or unclassified AEC information on research and development of reactors and other nuclear devices are granted to qualified persons upon application.

The AEC operates under review by certain statutory committees and with consultation from several advisory groups. It may be of interest to note the extent to which California was represented in the personnel of these committees, as of July 1, 1958, for it strikingly suggests the wealth of scientific talent in atomic energy upon which the Federal Government can draw in California.

California Personnel on Statutory Committees

Joint Committee on Atomic Energy—85th Congress (Nine members of the Senate and nine of the House of Representatives hold regular and special hearings and consider all legislation relating primarily to AEC or to atomic energy matters.) Senator William F. Knowland (now out of office), Representatives Chet Holifield and Craig Hosmer.

General Advisory Committee (Ten civilians appointed by the President advise the AEC on scientific and technical matters relating to materials, production, and research and development.) Dr. Edwin M. McMillan, associate director (now director) of University of California Lawrence Radiation Laboratory at Berkeley and professor of physics, and Dr. Edward Teller, associate director of University of California Radiation Laboratory at Berkeley (Dr. Teller has since resigned this position and Dr. McMillan has recently retired from this committee).

Patent Compensation Board (A three-member board hears applications for just compensation or awards of royalty fees.) No California members.

Advisory Committee on Reactor Safeguards (Fourteen members, appointed by the Commission for four-year terms, review safety studies and facility license applications referred to it and make reports thereon, advising the AEC on hazards of proposed or existing reactor facilities and the adequacy of proposed reactor safety standards. Its reports become a part of the record of the application and except for security material are available to the public.) Dr. Mark M. Mills, associate director of Livermore Laboratory (since deceased), and R. H. Graham of Lockheed Aircraft Corporation, Palo Alto.

Atomic Energy Labor Management Relations Panel (Five members selected by the President assist in arriving at peaceful adjustments of labor-management disputes when normal processes of collective bargaining and mediation have failed.) Arthur M. Ross, professor of industrial relations and director of the Institute of Industrial Relations, University of California at Berkeley (no longer a member).

Military Liaison Committee (A chairman appointed by the President, and two representatives, chosen by the Secretary of Defense, from Army, Navy, and Air Force.) No California members.

California Personnel on Advisory Bodies

Advisory Committee for Biology and Medicine (Nine members, appointed on the recommendation of the AEC's Medical Board of Review, review the programs in medical and biological research and health and recommend general AEC policies in these fields.) Dr. Henry I. Kohn, clinical professor of experimental radiology, radiological laboratory, Medical Center, San Francisco, and scientific secretary for this committee.

Advisory Board of Contract Appeals (There are five members, one or more of which hears contract appeals arising in case of disputes over AEC contracts and subcontracts and makes recommendations to the AEC general manager concerning their disposition.) Robert Kingsley, dean, School of Law, University of Southern California, Los Angeles.

Advisory Committee on Industrial Information (Fifteen members advise in planning and execution of AEC industrial information program.) No California members.

Advisory Committee on Isotope Regulation (Seven members establish new policies on distributing radioactive materials and review all initial applications for use of radioisotopes in human beings and all other requests for their use in research, education, and industry which are referred to it by the AEC.) Dr. Reynold F. Brown, department of radiology, Medical Center, San Francisco.

Advisory Committee on Reactor Physics (Seventeen members review and evaluate nuclear physics data and reactor physics studies required for design and development of reactors. Its advice and recommendations are used in planning research and development in this field.) Dr. E. Richard Cohen, Research Adviser, Atomics International, North American Aviation, Inc., Canoga Park; Dr. Theodore Merkle, University of California Lawrence Radiation Laboratory at Livermore; and Dr. Thomas M. Snyder, manager, physics—Atomic Power Equipment Division, General Electric Company, Pleasanton.

Advisory Committee for Standard Reference Materials and Methods of Measurement (Ten members review, evaluate, and recommend means for providing certified chemical and isotopic standards for uranium, plutonium, etc., and methods of measurement for materials of special importance to atomic energy activities.) Dr. Edwin F. Orlemann, professor of chemistry and chemical engineering, University of California, Berkeley.

Advisory Committee of State Officials (Ten members were appointed by the commission in September, 1955, as a means of getting the views and advice of state regulatory agencies in connection with the AEC's regulatory activities in the field of public health and safety.) A. C. Blackman, Chief, Division of Industrial Safety, California Department of Industrial Relations, San Francisco.

Committee on Raw Materials (Seven members review the AEC raw materials program and advise on questions of exploration, development, and procurement.) No California members.

Committee of Senior Reviewers (Six members, appointed for five-year terms, study major AEC technical activities, advise on classification-declassification matters, and make recommendations for the control of scientific and technical information.) Dr. John P. Howe, Chief, Research Department, Atomics International, North American Aviation, Inc., Downey; Dr. Frank C. Hoyt, physics division manager, missiles system division, Lockheed Aircraft Corporation, Palo Alto; and Dr. J. R. Richardson, professor of physics, University of California at Los Angeles.

Metallurgy and Materials Advisory Panel (Fourteen members, appointed on a yearly basis, make a continuing review of the AEC's program of nuclear cross-section measurements, and evaluate the needs

for cross-section information in the various activities of the commission.) Dr. Jack M. Peterson, University of California Lawrence Radiation Laboratory at Livermore.

Patent Advisory Panel (Three members make informal reports and recommendations on various policies and procedures relating to patents and inventions.) No California members.

Personnel Security Review Board (Three members review personnel security cases arising under AEC's administrative review procedure, and advise on criteria for determining eligibility for security clearance.) No California members.

Sherwood Steering Committee (Nine members meet as the need arises to recommend new projects to be undertaken, review progress and proposals, emphasis, and levels of support of research on peaceful uses of controlled thermonuclear—"fusion"—reactions.) No California members.

Stack Gas Problem Working Group (Eight members advise the AEC and its contractors on treatment and control of gaseous effluents, in the interest of keeping the air clean of radioactive material.) Dr. Charles E. Lapple, Stanford Research Institute, Menlo Park.[4]

This roster would be incomplete without mention of the fact that the present chairman of the AEC confirmed by the Senate on July 9, 1958, John A. McCone, is a Californian.

AEC owns 19 major research and development installations, operated under nongovernment contract, of which the best known are: Argonne National Laboratory, Lemont, Illinois, University of Chicago, contractor; Bettis Plant, Pittsburgh, Pennsylvania, Westinghouse Electric Corporation, contractor; Brookhaven National Laboratory, Long Island, New York, Associated Universities, contractor; Knolls Atomic Power Laboratory, Schenectady, New York, General Electric Company, contractor; Los Alamos Scientific Laboratory, Los Alamos, New Mexico, University of California, contractor; Oak Ridge National Laboratory, Oak Ridge, Tennessee, Union Carbide Corporation, contractor; and the four in California, namely, University of California Lawrence Radiation Laboratory at Berkeley and Livermore, the University of California Medical School project at Los Angeles, and the Radiological Laboratory at Medical Center in San Francisco, University of California, contractor.

Operations

The atomic energy program has been largely financed by the government and most facilities are still government-owned, but program operations and construction are carried out by private contractors and other organizations. Thus, with a directly affiliated staff of only about 6,000 employees, the AEC acts as a sort of holding company in the planning and supervision of programs carried on by operating contractors employing around 100,000 persons. For the fiscal year ending 1957, for example, practically all AEC expenditures on operations—approximately $1,754 million—were incurred under operating contracts, around $285 million going into the reactor development program—$174.5 million to military reactor projects and $53.2 million to civilian

[4] U. S. Atomic Energy Commission, *Twenty-fourth Semiannual Report, July, 1958*. Appendix 2.

reactor projects. Besides this, about $300 million was incurred for construction expenditures, about $115 million for military reactors, and $15 million for civilian reactors—all carried out by private contractors.[5]

A complicated set of institutional arrangements has grown up between the AEC, its prime contractors, and the great host of subcontractors and suppliers to whom the prime contractors let out some of their jobs.

For example, the means by which contracts are let is a kind of hybrid between those common in private and in public operations. The classic type of government contract is that of preparing detailed plans and specifications for what the government wants done, posting notice, and sending invitations to bid; with a standard form lump-sum contract to all comers, and award going to the lowest responsible bidder. This system has worked well for AEC construction and supply activities but has been found inapplicable to its research and development and production activities. To take care of these, AEC uses a negotiated cost-type contract—the government owning the facilities and assuming the risks; the contractor being reimbursed for his direct costs and his overhead, and receiving a fixed fee. This relationship between AEC and prime contractor has been called a kind of partnership arrangement.[6]

The co-operative spirit in which contract negotiations are carried out is indicated in this quotation from the executive director of the Joint Congressional Committee on Atomic Energy:

> * * * during negotiations of the contract, in addition to bargaining on fees, overhead and direct cost provisions, considerable emphasis is placed on mutual exchange of views on basic policies and procedures by representatives of the contractor and the government. * * * Immediately after execution of the contract, the parties usually work out more detailed guides and procedures on such matters as personnel, procurement and property. * * * Important problems arising during the life of the contract are discussed and solved by mutual agreement and not by the unilateral action of either party.[7]

In contracting, the AEC acts as proprietor with interest in getting a job done which it has wholly or in part paid for. When it comes to licensing companies to possess, use, and dispose of atomic materials, however, the AEC's interest and role is considerably different. The parties to a license are obviously not partners. In licensing, or in granting a construction permit, the AEC acts with sovereign power over the privately owned and financed operations.

An attempt is made by the AEC to separate its promotional from its licensing and regulatory functions. In 1958 a new office was created, the Office of Industrial Development, and the promotional and non-regulatory functions which had formerly been in the Division of Civilian Application were located there. Actually, the greater number of AEC's divisions are concerned with promotion—all its contract work, work in weapons and in AEC-sponsored reactor development, its research, its military applications division, raw materials procurement, international affairs division, and so on. The regulatory functions are

[5] James T. Ramey, "Atomic Energy and Government Institutions," *in* Atomic Industrial Forum, Inc., *Forum Report*, No. 12, v. 1, 1956, p. 45.
[6] *Ibid.*, p. 46-47.
[7] *Ibid.*, p. 48.

carried out by the two divisions of licensing and regulation, and of inspection. The former is centralized in Washington, D. C., while the latter, for closer awareness of local situations and more responsible relations with local personnel, is decentralized administratively in the field operations offices.

Licensing and Inspection

The Division of Licensing and Regulations receives and reviews applications, and grants and amends licenses, for the construction and operation of privately owned reactors and for the possession of radioactive materials over which the commission exercises jurisdiction. The Division of Inspection, through its field inspection districts, administers these licenses by gathering information to determine the compliance of licensees with the specific conditions of the licenses and with the rules and regulations of the commission.

Relations with industry are greatly complicated by the fact that many contractors are also licensees. The privately owned atomic industry which operates under the licensing regulations has largely grown out of the AEC contract program and is still supported in part by this program. Therefore many organizations are at one and the same time contractors and licensees or permittees. This is particularly true in the case of the AEC private power demonstration program, in which AEC under contract pays for part of the cost of constructing and operating demonstration reactors, and also licenses these reactors for private operation. The problem as to what role AEC and General Electric Company (to take a noninvidious example) may be exercising in relation to each other with respect to any particular matter, must sometimes become very difficult to determine.

Ramey points out:

> A further problem is raised by the relations between an equipment company which builds reactors under an AEC prime contract, and also wants to go into the business of building reactors for licensee power companies. How are public and private interests to be adjusted in these situations with respect to such matters as patents and access to information? And the problem is compounded when the equipment company wants to build its own test reactor under license! [8]

Such relationships are emphasized here because it seems important to recognize that the major atomic energy industries and engineering construction firms in California which might conceivably come under state regulation in some respect, already sustain rather complicated relationships with the AEC. When questions of state or local regulation of health and safety, the location of private reactors, taxing by local bodies and so on arise, the complexity of the present AEC-industry picture may add to the inherent difficulties of these problems.

AEC control in the interests of national defense and the public health and safety is achieved through requiring private industries or agencies to be licensed to possess and use certain atomic materials and facilities, and by requiring licensees to observe certain regulations as to manner of use.

[8] James T. Ramey, *op. cit.*, p. 52.

The materials under AEC control are: (1) *"source materials,"* consisting of uranium and thorium ores, and the metals and compounds from which special nuclear materials are derived; (2) *"special nuclear materials,"* consisting of uranium 233 and 235 (enriched uranium) and plutonium, which are the fissionable fuels for nuclear reactors; and (3) *"by-product materials,"* which consist of all radioactive materials and isotopes produced in nuclear reactors.

Since the definition of "by-product materials" covers only *reactor-produced* sources of radiation, other sources, such as radium, X-ray, fluoroscopic machines, and accelerator-type machines, are not subject to regulatory control by the commission.

The chief private facilities falling under AEC regulation are reactors and fuel fabricating plants. Applicants for licenses to construct or modify such facilities must first obtain a construction permit from AEC. Upon completion of the work in accordance with the permit, a facility license is issued. The operator—defined as the person who has authority and responsibility for deciding how and when controls shall be manipulated in a production or utilization facility and who works the controls himself or directs someone else to do so in his presence—must get an operator's permit.

An applicant for such a permit must pass an operating test and a written examination to show his understanding of the general design and characteristics of the facility for whose safe operation he will be responsible. He must be acquainted with general operating procedures, control and safety mechanisms, control-station instruments, the emergency shut-down system, and the purpose and function of radiation-monitoring equipment applicable to the operation. He must also pass a physical examination. There are no special educational requirements, and in many cases applicants qualify through on-the-job training.[9]

A significant part of a facility license application is the *hazards summary report,* which must describe in detail the reactor, its principal components, and the proposed operating procedure. In addition, it must give the applicant's best technical opinion as to what events could possibly take place in his reactor which could result in the release of radioactive materials; his judgment concerning the adequacy of the countermeasures taken in design and operating procedure to minimize the probability of these events; his conclusions on the effectiveness of the specified containment and isolation of the effects should they occur; and his assessment of physical and demographic factors surrounding the proposed facility location.

Where power and test reactors are concerned (but not for research reactors) the application, including the hazard summary report and the AEC staff analysis of this report, must be submitted to the Advisory Committee on Reactor Safeguards. The advisory committee's status is, however, just what its name suggests—advisory. The Commission is the final authority as to whether its advisory committee's recommendation shall be followed or not.[10]

The possession, use, and disposal of byproduct materials are also subject to license. These, we have noted, are defined by AEC so as to

[9] Atomic Energy Commission, *Atomic Energy Facts* (September 1957), p. 19.
[10] See "Press Round Table on Reactor Safety" *in* Atomic Industrial Forum, Inc., *Forum Report,* No. 12, v. 1, 1956, p. 175-83, especially p. 177.

cover both fission-product radioisotopes produced in the fuel of nuclear reactors and those made by neutron irradiation of stable isotopes in or around the reactor. From the standpoint of state regulation of atomic energy it is well to note that cyclotron- and other machine-produced radioisotopes do not come within the definition of "byproduct materials" in the sense that it is used by AEC, and may therefore be obtained and used without license. While production of radioisotopes by such means will probably always be limited, due to the high cost compared to reactor-production, some such isotopes serve certain unique needs, and when produced incidentally to other uses of the machines, are likely to be available for sale. Their production is said to be increasing significantly in the United States.

The question has lately arisen whether the Federal Government will assert title to byproduct materials produced in privately owned reactors. This does not appear to be likely. However, their use will not go without regulation by AEC, since the reactor-operator's license must include permission to possess and transfer, and the buyer must be licensed to possess and use, such materials.

Actually there are two types of licenses granted for byproduct use, "specific" and "general" licenses. Specific licenses are issued to named persons, and for a specified time and specific use. The application must be for an AEC-authorized purpose, equipment and facilities must be adequate to protect health and property, and the applicant must be trained or experienced to use the material. Also, records must be kept of its receipt, transfer, export, and disposal.

General licenses are not "issued" at all. They are a general permission granted by publication of terms and quantities in the Federal Register, under which their use is permitted.[11] The kinds and quantities of radioactive material coming under general license are considered by AEC to be insignificant from a hazard point of view. Notwithstanding the fact that the individual does not have to file an application for use of these materials, he is expected to comply to AEC protection standards. Some check is made on the companies which manufacture equipment or sell material coming under the general license, to be sure that they meet AEC requirements.

When radioisotopes are to be administered to a human being in any way, either externally or internally, additional requirements must be met.

Licenses may be revoked after a hearing.

Curtis A. Nelson, Director of the Division of Inspection in Washington, D. C., explains the work of his division (in our paraphrase):

Inspection is made of: (1) facilities like reactors, or fuel processing plants, both during construction and operation; (2) methods of handling source material or special nuclear material by processors, fabricators, or exporters; and (3) of users of byproducts in research, medicine, and industry.

Normally certain operating standards are included in the reactor license provision, covering such matters as safe limits of fuel temperature, of power levels at different stages of operation, and of rate of rise in power level; each reactor design requiring specific standards drawn in terms of its characteristics.

[11] These provisions are contained in the *Federal Register*, Title 10, 30.71 and 30.21.

The first operating inspection of a reactor may take considerable time. It will include testing of the use of equipment through dummy-running, loading the reactor with live fuel elements, and the initial run to criticality.

Carefully examined are:

(a) The dynamics of the reactor and the fundamental characteristics of the particular design, such as coolant velocity, temperature, and pressure, and fuel loading and unloading mechanisms;
(b) The control system; its versatility and margin of control;
(c) The safety system with regard to automatic action, interlocking, effective time response, and so on;
(d) Instrumentation; its responsiveness and dependability;
(e) Operating procedures and emergency procedures; including their clarity and the care with which they are followed;
(f) Safety factors inherent or built into the machine;
(g) Provisions for protection of personnel and equipment against radiation effects.[12]

According to members of the inspection division of the San Francisco Operations Office, all licenses are evaluated when they are first issued, and the type and frequency of inspection is determined on the basis of the hazards involved. All strontium 90 users—and indeed the users of the majority of sealed source materials—must make leak tests every six months, the records of which are reviewed when the inspector visits the plant. Many plants are never visited, inspectors using judgment as to which are probably most dangerous, and dealing with them on a priority basis. There are four inspectors working out of the San Francisco operations office, covering a territory including all of California and Nevada, some Pacific islands, and Hawaii.

The San Francisco operations office finds five groups of large industrial users in California: oil companies, or their research departments; reactor companies, especially those with licenses to produce and sell by-product materials; radiography companies, doing nondestructive inspection; companies offering oil-well logging and similar services; and secondary distributors, who procure radioactive materials for process and resale, and who consult or give service.

A sixth class of user to be mentioned accounts for the largest *number* of licenses in California—the medical profession, including physicians, hospitals and clinics, and pharmaceutical companies. The AEC does not inspect private practitioners as a rule, but it takes a look at the larger clinics and hospitals to check on procedures. It must be remembered that one of the AEC advisory committees, that on isotope regulation, reviews the qualifications of all persons or institutions when they make initial application for the use of radioisotopes in human beings. As medical use grows, however, the burden of this review is becoming very great, and the trend is toward putting this responsibility on the shoulders of the medical profession itself.

[12] Curtis A. Nelson, "Compliance with AEC Regulations," *Texas Law Review* 34: 862-66, June, 1956.

Training Program

In the interests of readying state personnel for supervision of health and safety programs, the AEC offered four fellowships to each state for the academic year 1957-1958, covering nine months of academic training at the University of Michigan and two or three months in one of the AEC national laboratories. No state was able to take advantage of this offer in 1957, but four California state employees, two from the Health Department and two from the Department of Industrial Relations, are participating in the 1958-1959 program. No other state is represented in this first class of the fellowship program.[13]

The AEC's policies and activities and its organization for scientific and technical work not especially germane to the states' interests in control and development of nuclear energy have not been included in this survey.

OTHER FEDERAL AGENCIES CONCERNED WITH NUCLEAR ENERGY ACTIVITIES

Department of Agriculture

The interest of this department is to prevent impairment of health, through contact with radioactivity, of the persons who produce, handle, process, and market farm products, and of the animals and plants upon which our populace depends for food and other agricultural materials. The Department of Agriculture co-operates with departments of public health in food-monitoring programs in some areas, and with research on the effects upon normal growth of accumulation of radionuclides in animal or plant products used for food.

Department of Commerce

The National Bureau of Standards within the Department of Commerce is concerned with measurement of radiological dosages, and physical methods of control through proper design of equipment using radioactive materials. The bureau sponsors the National Committee on Radiation Protection and Measurement, whose published handbooks are taken as the established authority for basic standards, and criteria upon which many AEC regulations are founded.

The Civil Aeronautics Administration, also within this department, issues safety standards and civil air regulations which are published in the Code of Federal Regulations as part of Title 14, "Transportation of Explosives and Other Dangerous Materials."

Department of Defense

Beside developing, transporting, and exploding nuclear weapons, the Department of Defense is active in military applications of nuclear energy for propulsion of ships, planes, locomotives, and tractors; in food preservation; and in the "packaged power" reactors—mobile units which can be transported in sections and set up rapidly at their point of destination.

[13] The salaries of these California personnel are being continued while they are at study, without which it would not be possible for them to take advantage of the program. When other states follow suit, there will doubtless be larger participation.

Department of Health, Education, and Welfare

The Public Health Service works with state health authorities to establish health control programs; provides training of state personnel in principles and techniques; carries on field surveys and demonstration programs; and gives grants-in-aid to states to finance health programs. Its Conference of Governmental Industrial Hygienists fosters industrial hygiene programs among the various state health agencies. This group's Committee on Threshold Limits has recommended, from time to time, limits for radiation exposure.

In February, 1958, the surgeon-general set up a National Advisory Committee on Radiation; and in March, 1958, there was created a Division of Radiological Health within the Bureau of State Services of the Public Health Service to give technical aid to state agencies concerned with public exposure to radiation.

The Food and Drug Administration, within the department, asked for legislative amendments to the Food, Drug, and Cosmetics Act to give it authority to act in protection of public health and safety in relation to the use of atomic energy in processing food and drugs. It is interested, together with the Department of Agriculture, in the potential contamination of crops grown for food.

The Children's Bureau, of the Social Security Administration, is interested in radiation effects upon the health of children.

The Office of Education is concerned with the need for training personnel in atomic energy and radiological health.

Department of Labor

The Bureau of Employees' Compensation, in this department, which administers federal laws relating to workmen's compensation, is interested in possible needed changes to come to grips with the unusual circumstances surrounding disease due to radiation exposures.

The Bureau of Labor Standards works along with state labor departments to promote industrial health and safety in hazardous occupations such as radiation work, under the Fair Labor Standards Act; to coordinate enforcement of child labor and health and safety laws between federal-state agencies; and to train state safety personnel in protection techniques. Under the Fair Labor Standards Act, the department amended, in June, 1957, its order on employment of children under 18, including "ionizing radiation" under "hazardous conditions" and setting permissible dose limits for minors to 10 percent of adult exposure limits.

National Science Foundation

This agency has statutory responsibilities to work on problems of basic physics, genetics, and biology which must be solved if scientific health standards are to be developed for an economy in which atomic energy is extensively used. To this end, it provides grants and fellowships encouraging such fundamental research.

Weather Bureau

The Weather Bureau gathers data needed for understanding the dynamics of natural and man-made radiation in the atmosphere, cooperating with federal and local health departments in their efforts to monitor and to prevent radiation exposure of whole populations.

Interstate Commerce Commission

The ICC classifies radioactive materials as "class D poisons," and regulates their transportation by common carriers engaged in interstate commerce, in Parts 71-78 of Title 49 of the Code of Federal Regulations. Small quantities are exempt from "prescribed packaging, marking and labelling requirements" if they satisfy certain safety requirements.

Post Office Department

Regulation of the amount and packaging of radioactive materials which may be sent by mail is a responsibility of this department. In 1949, it set limits below those declared exempt by ICC regulations.

U. S. Coast Guard

In Title 46 of the Code of Federal Regulations, the Coast Guard regulates the transportation of radioactive materials within its jurisdiction.

Incidentally, co-ordination among federal agencies responsible for hazards arising in the course of transporting radioactive materials, has been less than complete. As an example, the AEC in September, 1957, proposed a regulation, on which it invited public comment, designed to prevent accidental assembly of critical amounts of special nuclear materials during shipment. This proposed rule constituted AEC's first definite entry into the regulation of transportation of materials peculiar to the atomic energy field. The Atomic Industrial Forum criticized the rule as inadequate to accomplish its purpose, and asked pointedly why the proposed rule had not been submitted to the ICC for co-ordinating action. In brief, the AEC rule would allow its own licensees—those authorized to receive, possess, use or transfer special nuclear materials —to ship at any one time amounts not to exceed 350 grams of U 235 (and similarly specified quotas for other special nuclear materials), under prescribed supervision. But if the licensee used a common carrier, he would not be allowed to ship more than 100 grams of U 235 (and similarly specified quotas for other special nuclear materials). The two sets of limits were said by AEC to be required because a common carrier "might receive a number of small quantities from different shippers, which if included in the same shipment, could total enough special nuclear material to create hazard if the individual pieces were accidentally brought into close proximity." The Atomic Industrial Forum commented, however, that by specifying only the amounts of special nuclear materials which may be delivered to a common carrier by any licensee for any one shipment, *instead of binding the carrier to a specified maximum amount of material which he might ship for several licensees at one time*, the regulation left a loophole in its attempt to control criticality conditions.

> The ICC regulations, meanwhile, do not cover criticality conditions and the rules provide no measure of control over the amount of special nuclear material a carrier may accept and ship. Hence it appears entirely possible, while following the letter of AEC and ICC rules, for a carrier to assemble from a number of shippers amounts of special nuclear material exceeding the limits proposed for a single licensee-controlled shipment.[14]

[14] Atomic Industrial Forum, Inc., *Atomic Industrial Reporter*, 121:3 (September 25, 1957), p. 307-308.

Responsibility for controlling hazards attendant upon marine transportation are especially troublesome to assign. As will be argued, only an international agency can fully serve here. Meanwhile the states may find it wise to assume a large part of the burden of discovering and dealing with the effects of nuclear industry within their ports and along their coasts.

STATE AGENCIES AND NUCLEAR ENERGY

The Assembly Legislative Interim Committee on Public Health—Subcommittee on Air Pollution and Radiation Protection—has held several hearings in California, and conducted intensive investigation, to discover the areas of concern of state agencies and departments with nuclear energy activities. The reader is referred to the full report of their findings contained in the study to which this one is a companion and background report.

In Chapter VI a discussion and summary of the specific control and development activities in which other states have engaged will be presented. It may, however, be illuminating, and sufficient to indicate the complexity of governmental implications, to reproduce here a chart worked out by the department of public health in another state—Massachusetts—pursuant to a 1957 legislative resolve there. (See Chart A, pages 94-95).

It is safe to state in summary that nuclear activities of industry, agriculture, medicine, and the military cut across the central or tangential interests and jurisdictions of almost every state department and agency.

COUNTY AND MUNICIPAL AGENCIES WITH AREAS OF CONCERN IN NUCLEAR INDUSTRY

Mayors, county supervisors, city councils, planning agencies, zoning agencies, building code enforcement agencies, fire, police, and local health departments, and the highway patrol may any or all have occasion to understand the dangers of radioactive materials and methods of coping with them. Local officials need to be informed and consulted on the direction and control of this new force which recognizes no political boundaries, if they are to serve the best interests of their citizens. And what is even more evident, there is need here for planned co-operation between levels of government.

In a Pennsylvania publication put out by the Associated Institutes of Government of Pennsylvania Universities, an article entitled "Local Government and Atomic Control" discusses the implications of atomic industry for local officials:

> A new industrial plant in a neighboring county had been granted a permit by the state to dispose of low-level radioactive wastes into a stream which connected with a large river and in the course of a few miles became the water supply for several municipalities.
>
> The plant had been built in strict compliance with the requirements of the Atomic Energy Commission. The state department of health and the company operating the concern assured the municipalities that the level of radioactivity of the waste was so

slight as to be virtually harmless to the water supply. Any emergency or accidental "spill" would be reported immediately to the downstream municipalities.

However, what if the unexpected happened? The affected municipalities would be notified. What would they do then? There is no clear answer. Almost certainly the municipality would have to rush to the state or federal government for aid. Municipal officials need enough understanding of the problems of atomic energy to make intelligent and sometimes immediate decisions.

In dealing with atomic energy, the old, cramped concepts of local sovereignty no longer hold. This is an evolving field, and it would seem wise, as far as national defense will allow, to give the responsibility for the many aspects of atomic control to that level of government best able to perform it. This would leave a role for the municipality. When the health and safety of their citizens are involved, local governments—municipalities and counties—cannot abdicate their responsibility to another level of government.

* * * * *

The great majority of municipalities and local governments is still on the outside looking in at atomic development. Municipalities need to zone for nuclear industries but they have no standards available. How much space is enough to protect neighboring areas from a nuclear plant? Their building and plumbing inspectors are faced with new methods and materials which the normal codes do not cover. The police and fire departments need to know the amounts and locations of atomic equipment and materials in their communities, but this information is usually not available. Municipalities would like to know about transportation of radioactive materials through and within their borders. Most of all, local officials need to know what to do in case of emergency. The answers are not ready at hand. [15]

Perhaps the first sharp impetus to local preparedness for atomic control was given by an accident occurring at Windscale Works in England, October 10, 1957, when an unforeseen rise in temperature led to a fire in the reactor, releasing radioactive iodine and strontium to the air over a long strip of the Cumberland Coast. Among the remedial steps taken to quiet and protect a much disturbed local populace, were action to prevent the distribution of milk produced by cows which might have eaten radioactive grass, and the making of repeated tests of the thyroid iodine content of local inhabitants.

The committee of inquiry investigating the cause of the accident reported it as being due partly to inadequacies in the instrumentation at the reactor, partly to certain gaps in the science which deals with radioactive materials; and partly to faults of judgment on the part of the operating staff—these faults of judgment being themselves attributable to weaknesses of the organization of the United Kingdom Atomic Energy Authority. The gaps in scientific knowledge referred to were the absence of established tolerance levels for radioactive iodine in milk, and of definite standards for short-term exposures over a control period of 13 weeks. Lacking such guides, the health and safety staff

[15] "Local Government and Atomic Control" in *Horizons for Modern Pennsylvania Local Government*, v:8, September, 1958.

Chart A

THE COMMONWEALTH OF MASSACHUSETTS [16]

DEPARTMENT OF PUBLIC HEALTH

INFORMATION RELATIVE TO CHAPTER 106 – RESOLVES 1957 STUDY

Activity, Interests, etc. Relative To Regulation and Control of Radioactive Material

Department or Agency			1 Accidents	2 Agriculture	3 Air Pollution	4 Boiler Inspection	5 Budget	6 Building Const., State	7 Coordination	8 Decontamination	9 Disposal	10 Distribution	11 Education	12 Emerg. (Natural)	13 Emerg. (War)	14 Environment	15 Exploitation	16 Fire	17 Food	18 Industrial Use	19 Insurance	20 Law	21 Legislation	22 Medical Use	23 Packaging & Labelling	24 Personnel (Add'l)	25 Power Use	26 Production	27 Promotion	28 Records of Users	29 Research Use	30 Sale	31 Standardization	32 Storage	33 Stream Pollution	34 Training	35 Transportation	36 Water Supply	37 Occupation Environment
Code	Name																																							
1	Adjutant General						S		S				S	S								S												✓					
2	Admin. & Finance, Comm. of						C		S													C S			P								C					
a	Budget Bureau						P		S													S												P					
b	Building Construction, Div. of						S	S	S								S					S	S											✓					
c	Personnel & Standard, Div. of						S		S													S												S					
3	Areonautics Comm., Mass			S			S		S				S	S								S												✓	S				
4	Agriculture, Dept. of		C				S		S						C			C				C P												C					
a	Milk Control Comm.		S				S		S						P			P				S												✓					
b	Research		P				S		S	S					P			P				S								P				✓					
5	Airport Management Bd., State	S					S	S	S	S			S	S			S					S		S								S		✓	S				
6	Atomic Energy, Comm on	C	C	C	C		S	C	C	P C		C	C	C	C	S	S	C	C		S	C	S	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
7	Atomic Energy, Ind. Research Center, Comm on Est. of						S		S										S			S	S			P	S	P		P					C				
8	Attorney General	S					S		S				S	S							P	S																	
9	Civil Defence Agency						S		S	C P			C	C								S												P					
10	Commerce, Dept. of	S					S		S							S			S	S		S		S		S	S	P	P	P	P			S				
11	Education, Dept. of						S	C	S			C										C S								C				C					
a	Lowell Tech						S	S	S	S		P										S								P				P					
b	Mass. Maritime Academy						S	S	S	S		P										S				P								P					
c	Mass., University of						S	S	S	S		P										S								P				P					
d	Normal Schools						S		S			P										S												P					
12	Insurance, Div. of	S					S		S				S	S			S		S	C P	S	S					S		P			S			S			
13	Interstate Cooperation Comm.	S		C			S		S		S		S	S								S												S		S		
14	Interstate Water Pollution Control C						S		S				S								S	S												S		S		

15	Labor & Industries, Dept. of	C				S	C	S	C			P	C	S			C		C		C	C P		P		C	C		C	C	C		C		C	C		P					
a	Conciliation & Arbitration	S				S		S	S										S		S	S																					
b	Employment Security, Div. of					S		S											P		S	S					S																
c	Industrial Accidents, Div. of	P				S		S	S				S	S			P		P		S	S		S		S	S		S	S	S		P		✓	P		S					
d	Industrial Commission, Mass.					S		S											S			S				P	P		S	P													
e	Industrial Safety, Div. of	P				S	P	S	S				S	S			P		P		S	S		P		S	S		S	S	S		P		✓	P		P					
f	Occupational Hygiene, Div. of	P				S	P	S	S			P	S	S			P		P		S	S		P		S	S		S	S	S		P		✓	P		P					
g	Standards, Div. of					S		S											P			S		P		S	P			S	S	P			✓								
16	Natural Resources, Dept. of					S		S	S				S	S	C	©P						C P								P				C	C								
a	Marine Fisheries, Div. of					S		S		S					P							S												P	✓								
b	Water Resoucces Comm.					S		S		S			S	S	P							S												P	✓		S						
17	Port Authority, Mass.	S				S	S	S		S			S	S								S		S		S							S			S							
18	Public Health, Dept. of	C				S	C	S	C	C		C	C	C	C						C	C P	©	C			C		C	C	C		C	C	C		C	P					
a	Cancer & Other Chronic Diseases, Div. of					S		S	S													S	S							P					✓								
b	Food & Drug, Div. of	P	P			S		S	P				P	P	P			P			S	S		P			P		S		P				S								
c	Hospitals, Div. of					S	S	S	S	S			P	P								S	P							P			S		✓			P					
d	Institute of Laboratories					S		S														S													S								
e	Sanitary Engineering, Div. of	P		P		S	P	S	P	P	P	P	P	P	P		S		P		S	S	S	S		P	S		S	P	P		P	©P	S	P	©P	S					
f	Training & Research, Div. of					S		S				P										S								P					P								
g	Tuberculosis & Sanatoria, Div. of					S		S					P	P								S	P							P			S		✓			P					
h	Dental Health, Div. of					S		S				P										S	P							P					✓			P					
19	Public Safety, Dept. of	C				S		S					C	C								C P							C				C		C								
a	Fire Prevention, Div. of	P				S		S					P	P			C P					S							S				P		S								
b	Inspection, Div. of	S			S	S		S														S		S		S	S		S				S		✓								
c	State Police	S				S		S	S				P	P								S		S											S	S							
20	Public Utilities, Dept. of					S		S	C				C	C					C			C P		C											C								
a	Commercial Motor Vehicle Div.	S				S		S	S				P	P					P			S		S											✓	S							
b	Engineering Division				P	S	P	S					P	P					P			S				P	P								✓								
c	Railway & Bus Utilities, Div. of	S				S		S	S				P	P								S		S											✓	S							
21	State Needs, Commission					P		S				S				S			S		P	P						P							P								
22	Plumbers, State Examiners of									S																																	

LEGEND

P – Principal Interest S – Secondary Interest C – Coordinating Interest

[16] The Commonwealth of Massachusetts. Department of Public Health, *Report on Regulatory and Protective Measures Pertaining to Radioactive Materials* (December, 1958), p. M-12.

were understandably indecisive as to what measures to take and when to take them. The organizational weaknesses referred to had partly to do with lack of administrative machinery on the local level to secure prompt and informed citizen co-operation.

The British committee of inquiry observed:

> * * * we have become aware during the course of our investigation that improvements to the authority's organisation will not alone achieve all that is required. There is an urgent need to clarify the relations between the many Government Departments concerned with health and safety in the atomic energy field and to strengthen the co-ordination between them * * * [17]
>
> * * * public anxiety * * * is naturally felt most keenly near atomic energy installations and it is therefore incumbent on the authority to establish public confidence in the neighbourhood of each of their Establishments. In his Memorandum to the Prime Minister, Sir Edwin Plowden (Chairman of the U. K. AEA) pointed out that the accident at Windscale had indicated the need for closer liaison between the management of the factory and local interests.
>
> He reported that a Standing Liaison Committee had been set up at Windscale and that similar committees were being established by the other operating factories of the Industrial Group. The purpose of these local Committees is primarily to reassure local opinion on the hazards involved, to convey to the lay public the significance of any incident, and to create administrative machinery for the protection of the population in the event of a serious accident.
>
> * * * Instructions have been given to Works General Managers to set up committees, in consultation with the Clerk to the County Council, and including such representatives as the following:
>
> Works General Manager
> Health and Safety Branch staff
> Clerk to the County Council
> County Medical Officer of Health
> Chief Constable
> Civil Defense Officer
> Fire Brigade Officer
> Representatives of Local Authorities
> Representatives of Ministry of Agriculture, Fisheries and Food
> Representatives of National Farmers' Union
> Representatives of any other local interest which may be affected by the incident at the establishment, e.g., River Boards, etc.
>
> In general, these local liaison committees will represent interests in the County in which the Authority establishment is situated. In view of the possibility of hazards extending across county boundaries, however, the intention is to invite the Clerks of adjacent County Councils to nominate a Liaison Officer to join the Committees where this is thought to be appropriate.[18]

[17] Great Britain. Atomic Energy Office, *Report of the Commission appointed by the Prime Minister to examine The Organisation for Control of Health and Safety in the United Kingdom Atomic Energy Authority* (Command 342, January, 1958), p. 6.

[18] *Ibid.*, p. 19-20.

One interested Boston attorney studying the Windscale accident with an eye to what should be learned from it for American practice, concludes:

> Based upon the experience at Windscale, it becomes mandatory on the part of any operator of a nuclear energy facility to plan for close liaison with local people who reside in the area which would feel the effects of an accident. A liaison committee could do much to establish public confidence in atomic energy. The purpose of such a body would be to inform the public as to the hazards of nuclear energy (which should be done fairly and frankly), to provide for dissemination of information of the significance of any atomic incident, and to provide a trained group which can protect the population in the event of any accident which might occur.
>
> This task cannot be left to the AEC, nor is it truly a job which can be done properly at the state level. It is rather a matter for those at the local and regional level.
>
> * * * this liaison group might properly consist of the manager in charge of the atomic plant, the health and safety officers attached to the plant, regional health officials, representatives of local or regional governments, interested medical officers, police, fire and public safety officials, and others who work for the protection of life and property.
>
> In addition it is very important that representatives of the press, radio, and TV media be included in such a liaison committee, for * * * misinformation about the hazards of nuclear energy, in a time of crisis, could be the cause of unnecessary (and grave) consequences. * * *
>
> It does not now seem that the Civil Defense organization can handle this liaison problem alone. Civil Defense is a vital part of the picture, but only a part. It is also definitely not in the interests of the majority of the citizenry that any fact which might bear on legal liability for an atomic incident be kept secret from responsible public officials, including the prosecuting officers of the state and county.[19]

Fine as is the operating record of AEC's own installations, it does not seem to justify such blanket reassurance as that given (for example) by AEC Commissioner Harold S. Vance, speaking to the United States Conference of Mayors in September, 1957, when he said:

> My purpose this morning is to give you positive assurance that the millions of people who live in the cities of America for whose health and safety you have a direct responsibility are not going to be harmed or endangered in any way by the employment of this new and wonderful source of energy in its peaceful applications for the benefit of mankind.[20]

In contrast, the official attitude expressed by the British committee was: "Now that the nation is committed to a large nuclear power programme, we consider it of the first importance that the hazards of

[19] James B. Muldoon, "Alice in Nuclear Energy Land," *Massachusetts Law Quarterly* 42, December, 1957; and 43, March, 1958.

[20] Harold S. Vance, "Peacetime Applications of Atomic Energy as They Will Affect Cities," United States Conference of Mayors, *Annual Proceedings*, September 9-11, 1957:70.

atomic energy should neither be exaggerated nor minimised in the public mind."[21]

Possibly one important function of a state co-ordinator of atomic energy activities, or co-ordinating committee or agency, might be to see that local liaison committees are set up in the vicinity of nuclear reactors within the State.

Several cities have adopted limited local regulations of their own: Los Angeles and San Francisco in Calif.; Denver, Colo.; Washington, D. C.; Louisville, Ky.; Ann Arbor, and Detroit, Mich.; New York City; Cincinnati, Cleveland, and Piqua, Ohio; Philadelphia, Penn.; Seattle, Wash.; Milwaukee, Wisconsin. Most of these merely require the administration and enforcement on the local level of AEC standards or state standards. Two—Ann Arbor and New York City—require registration of radiation sources,[22] and New York City has undertaken thoroughgoing measures to handle all aspects of the control problem within its boundaries.

For example, in March, 1958, the New York City Department of Health adopted an article which revokes permits for radiation previously issued, prohibits shoe-fitting fluoroscopy, and requires registration of all radiation installations with the City Department of Health, charging a $15 fee for each such installation. Other sections of the article give definitions, exemptions, radiation safety officer duties, safety requirements, requirement of prompt notification of radiation accidents, disposal of radioactive human remains, control of radiation exposure of food, limitations on medical applications of radiation to humans, and provisions for co-operation with other governmental agencies.

Besides this, New York City established in mid-1956 a radiological unit in its city fire department, and radiation monitoring instruments are carried routinely by all engine companies, a member of each fire battalion having been given a training course in radiation monitoring.

In May, 1957, some 200 police officials attended a three-day training course on radiation hazards presented by AEC's Division of Safety and Fire Protection.

In April, 1958, New York's mayor created an Interagency Council on Radiation representing 15 city agencies concerned with radiation control, with the assistant city administrator as chairman; and in May, 1958, he appointed a 10-member technical advisory committee on radiation to keep him "informed of significant developments in the radiological field which may affect the city."

The Port of New York Authority in July, 1958, adopted regulations for the transportation of explosives and other dangerous articles, including radioactive materials. They prohibit vehicles from entering any tunnel under its supervision if their loads include any radioactive materials, "Class D poisons," unless the type and quantity can meet the standards of ICC or "special permission for passage" is obtained.[23]

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[21] Great Britain. Atomic Energy Office, *Report of the Committee appointed by the Prime Minister to examine The Organisation for Control of Health and Safety in the United Kingdom Atomic Energy Authority* (Command 342, January 1958), p. 5.

[22] Ann Arbor City Code (1957), Title II, Ch. 28, paragraph 2.45 (8), "Sewers and Sewage Disposal"; New York City Sanitary Code (1958), Art. 6, Sec. 107, "Control of Radiological Hazards."

[23] Port of New York Authority, *Rules and Regulations,* July 1, 1958: Sec. 9.18.

In July, 1958, believing that the determination of exposure conditions depends largely on the adequacy of the monitoring instruments used, New York City's Department of Health announced that it would test and calibrate sample film badges of all commercial film badge services, and after evaluation offer a list of approved services to users under the city's radiation code. The list is to be kept up to date by subsequent spot-checking, and all known services were asked to submit samples.[24]

In a letter sent to all users of radioactive equipment or materials, the New York City Health Commissioner said, in part:

> * * * The increased, and constantly increasing use of X-ray and similar devices, isotopes and other materials emitting radiation, both in medicine and industry, make it necessary to enact these regulations.
>
> The department is mailing registration forms to doctors, dentists, veterinarians, to industrial firms, hospitals, research and other laboratories. * * * The Department of Health estimates that approximately half of the 18,000 physicians in the city have and use X-ray equipment in their offices; that almost all of the city's more than 8,000 dentists also have X-ray equipment, and that a considerable percentage of the 900 podiatrists, 200 osteopaths, and 150 veterinarians also have X-ray or fluoroscopy equipment. Industrial users of X-ray and isotope equipment, * * * number about 250, while hospitals, clinics, universities and governmental health centers which use radiation materials or equipment, number around 1,200.[25]

Los Angeles, site of one of the heaviest concentrations of atomic energy industry in the Nation, adopted in September, 1948, through its city board of health commissioners, "Rules and Regulations for Storage, Transportation, Processing, Use and Production of Restricted Chemicals,"[26] Section 4 being "Radioactive Compounds and Devices"; and in March, 1954, Rule No. 8 was added to these regulations, requiring that radiation protection "shall meet the requirements * * * of the California Division of Industrial Safety." The city also contracted, in January, 1956, with Hyperion Engineers for a study of the possibility of sterilizing sewage with nuclear radiation.

The Mayor of Los Angeles was reported, on January 15, 1959, to be setting up a mayor's technical advisory committee on atomic energy. He also announced his intention to see that city registration of radiation sources was required.

San Francisco's City Board of Supervisors adopted in 1953 an ordinance[27] regulating waste disposal into public and private sewers and drains, Section 9 of which applies to "Radioactive Wastes." This section requires all persons discharging radioactive wastes to be licensed by the AEC or other governmental agency so empowered, to discharge the wastes "in strict conformity with current AEC recommendations," and to assume full responsibility for any injuries that may result to persons or property.

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[24] *Nucleonics* 16: 29, July, 1958.
[25] New York City. Department of Health, *News Release* (September 19, 1958).
[26] Los Angeles, City Ordinance 91616.
[27] San Francisco, Ordinance no. 7425.

In recognition of the gravity of the problem facing cities, the Atomic Industrial Forum, a national association of atomic energy industries, sponsored a conference on the impact of atomic energy on state and local government, held October 13-15, 1958, in Columbus, Ohio. The report of its proceedings has furnished last-minute data for this report.

In December, 1958, the AEC entered into a contract with the American Municipal Association for a six-months study and report, at a cost of $14,860, covering current and anticipated effects of peaceful uses of atomic energy on local governmental functions and services. Of particular concern will be matters relating to public health and safety— the nature of requirements and standards controlling private persons using radioactive materials, physical planning and zoning, fire protection, and other measures protecting health and safety. AMA staff specialists in transportation, legislation, urban development, and community relations will prepare the report, under the direction of the Association's executive director.

Admirable, and indeed necessary as it is for cities to be concerned with the regulation of potentially dangerous industries within their borders, the greatest care will be needed to secure co-ordination and uniformity with state, and consistency with federal, codes. One nationally known corporation, commenting in reply to a letter of inquiry as to firsthand experience under New York regulations, pointed out:

> As you realize, New York State operates under several Codes. Industrial installations must * * * register their sources with the Department of Labor. Medical operators are under the jurisdiction of the State Sanitary Code. Installations within the confines of New York City must register with the New York City Department of Health. For reasons which baffle all, * * * State control seems to end at the city line. While we do not feel this situation to be oppressive, we certainly find it confusing.
>
> * * * One of the letters issued by the Department of Labor said in effect "Register with us, if you don't belong to us we will forward the material to the right people." I think it immaterial whether registration is with the Department of Labor or Health. The important thing is to have one agency in charge and to have jurisdiction over all medical and industrial installations in the entire State.

INTERNATIONAL NUCLEAR ENERGY AGENCIES

A striking amount of developmental, and some regulatory, activity in the field of nuclear energy is going on under international auspices. Only the highlights will be given here. But it should not be wholly overlooked if only because of its possible relation to the development of state regulatory standards in some areas, and its possible impact on the foreign export of nuclear reactors and materials from California firms.

United Nations

Two international conferences on the peaceful uses of atomic energy in Geneva in 1955 and 1958, sponsored by the United Nations, have made a tremendous contribution to international exchange of technical information. The proceedings of the first conference, 8,000 pages in 16

volumes, provide significant data on the world's energy requirements, the physics, chemistry, geology, physiology, and biochemistry of radiation, reactor production technology, applications of radioisotopes in research and industry, and the legal and administrative problems of large-scale international use of atomic energy.

The Scientific Committee on the Effects of Atomic Radiation, composed of 15 members from as many countries, was established by the UN in December, 1955. Its report, published in 1958, probably represents the most authoritative source to date on the nature and extent of the effects of atomic radiation upon human beings; although we are warned that such knowledge rapidly becomes out-of-date, and that modifications of its information and recommendations are sure to become necessary.

As to the specialized agencies of the UN:

The *International Labor Organization* (ILO) drew up the first international health and safety standards for industrial users of X-rays and radioactive substances in 1948, revising them in 1957.

The *Food and Agriculture Organization* (FAO) brings about co-operation between European member governments and the UN on radioisotopes and radiation in agricultural research, and provides information to governments on atomic energy techniques affecting agriculture, with the goal of raising productivity and nutrition levels.

The *World Health Organization* (WHO) engages in the training of personnel in radiological health, in public health administration in respect to radioactive waste disposal, and in the medical uses of radioisotopes; and awards fellowships for research in such fundamentals as the effects of radiation on human genetics, radiotherapy dosages, and radioactive waste disposal.

United Nations Educational Scientific and Cultural Organization (UNESCO) aids basic research in atomic energy, develops methods of training scientific and technical research workers and engineers, and disseminates scientific knowledge to the public. It is co-operating with the International Civil Aviation Organization and the UN Transport and Communication Commission in the development of standard regulations covering transportation and distribution of radioisotopes, and arranged a symposium in 1958 on the disposal of radioactive waste. In the area of specialist training, it helps send foreign professors and students to big research centers of atomic energy training; and is helping establish a nuclear physics department in a university in Pakistan (a country not covered by the UN technical assistance program).

The International Atomic Energy Agency

Sponsored by President Eisenhower in his 1953 atoms-for-peace proposal, the International Atomic Energy Agency (IAEA) held its second annual session in Vienna in September and October, 1958, with 400 delegates from 69 nations in attendance. The IAEA statute states as its objective "to seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world." It has been generally conceded that its most important function would be to siphon off fission materials of the present atomic powers into a so-called international atomic pool through which international exchange of these materials would take place, thus helping to assure that

all nations develop their atomic energy programs solely for peaceful uses.

IAEA Director General Sterling Cole (former Chairman of the Congressional Joint Committee on Atomic Energy) has charged, however, in a speech to the Atomic Industrial Forum in Washington, D.C., November, 1958, that United States policy is undermining the international agency by continuing to enlarge its program of bilateral atomic agreements with other nations in sale of atomic fuels, thus bypassing the IAEA. Cole pointed out too that while the United States had offered IAEA 11,000 pounds of enriched uranium fuel toward its supply of fissionable material, it has not set a price for this material; and that unless it is turned over at a preferential price individual nations will continue coming directly to the United States for their fuel purchases. Three quarters of the world's nations are engaging in direct bargains for fissionable material with the big atomic powers.[28] Meanwhile, the only formal request for a supply of nuclear source materials which has been received to date by IAEA from a member state, came from Japan in November, 1958.[29]

Other disturbing signs in this area are the resignation of Robert McKinney, Chairman of the Panel Committee which prepared the 1956 report on the Impact of the Peaceful Uses of Atomic Energy for the Joint Committee on Atomic Energy and permanent U. S. representative to IAEA, reportedly in protest at its inability to take effective charge of the international movement of fissionable material.[30]

Dr. Gunnar Randers of Norway, chairman of a 13-member panel of experts from 10 countries, set up by the international agency to work out international health and safety standards with priority given to recommendations for packaging, shipment, use and disposal of radioisotopes, has charged that the work of his committee in developing nuclear codes has been made almost impossible by United States checking actions.

However, in December, 1958, the IAEA issued its first technical publication, prepared by Randers' committee, a "Manual of the Safe Handling of Radioisotopes," covering organizational, medical, and technical aspects of safety practices. The manual will be periodically revised. It will provisionally govern all the IAEA's own operations in the radioisotope field and is recommended as guide to all member states in establishing national health and safety regulations.[31]

The 1958 annual meeting of the IAEA set up a larger budget than for the previous year, and members hope it may be possible to work toward such of its statutory functions as the standardization and calibration of radioisotopes and radiation, regulation of international transport of radioactive materials, and consideration of international action with respect to legal responsibility, insurance and radioactive waste disposal.

As to the last-named function, data introduced earlier as to the rapid approach of the day of nuclear submarines, nuclear tankers, and other nuclear shipping makes the problem an urgent one. The Chief of the Maritime Reactors Branch of AEC, speaking to the International Union

[28] San Francisco Chronicle *Editorial*, November 16, 1958.
[29] *Atomic Energy Newsletter* 20:7 (November 11, 1958) p. 1.
[30] *Atomic Energy Newsletter* 20:5 (October 14, 1958) p. 1.
[31] *Atomic Energy Law Reporter*, December 4, 1958.

of Maritime Underwriters in Salzburg in September, 1958, said that no adequate set of ground rules exists for worldwide disposal of radioactive material in the oceans, and the final resolution of the problem will require the regulatory dictates of an internationally accepted code of practice.[32] But not only radioactive waste produced at sea by nuclear-propelled ships is contributing to the ocean's potential contamination—the large atomic countries are disposing of ever-growing quantities of land-produced radioactive material by sea disposal.

> At the moment, material is being dumped by Britain, while America is issuing licenses for some commercial shipping lines to dump regular consignments. While the activity of each load is carefully limited, there is no worldwide correlation of all the material being disposed of in this manner. * * * Even * * * ground disposal techniques are to some extent bound up with the sea contamination problem because some active liquid does eventually find its way into the rivers and thence into the sea. Of course the aim of ground disposal technique is to make this draining liquid take so long to reach the sea that its activity is almost nil.
>
> However all these increments of activity should be measured and entered into some grand inventory held by an international body such as the IAEA. This would show the magnitude of present disposal and give every nation an idea of how much it can be permitted to dump in this way. Without such an inventory, each nation will go on dumping material to an extent decided by its own experts; and will not be able to take into account the material put into the sea by the rest of the world.[33]

The head of the Research and Development Branch of the United Kingdom Atomic Energy Authority, Industrial Group, at Windscale Works, has stated:

> In the United Kingdom we know that by 1965 the electric generating capacity then installed will require the annual consumption of 6 to 8 tons of nuclear fuel (U235) and this in turn will give rise to a similar amount of fission-product waste, the radioactivity of which will depend on the fission-product elements present and their age. In that year it is expected to produce fission products with an activity of 1000 Mc (10^9c) after 100 days of "cooling." * * * It is calculated that 10 c of fission products would have to be diluted with a million cubic miles of sea water in order to bring the concentration down to the level permitted in drinking water. * * * There is every likelihood that the annual production will increase in subsequent years. Probably 50 to 100 times this amount may be produced annually by the end of the century.[34]

Similar predictions as to amount of fission products to be expected in future years are contained in the introduction to the report "The Effects of Atomic Radiation on Oceanography and Fisheries," published in March, 1958, by the National Academy of Sciences. Computations are based on the generation of 365 grams of fission products for

[32] *Atomic Energy Law Reporter*, September 23, 1958.
[33] Editorial "Atomics and Nuclear Energy," *Journal of International Nuclear Industry* 9:331, October, 1958.
[34] K. Saddington "Fission-product disposal" *Journal of the British Nuclear Energy Conference* 3:4 (October, 1958), p. 290-97.

each megawatt-year of heat produced in a nuclear reactor. By 1965, the United States will be turning out four tons of fission products annually; and on the basis of announced programs, Britain will be adding 8.8 tons by that year, Japan 1.6 tons by 1965, and Euratom 21.9 by 1967. If other areas of the world develop nuclear power "some 80 tons per year of fission products" will be produced by 1970. After 100 days of cooling, this represents * * * one-tenth of the total natural radioactivity of all the oceans.[35]

European Organization for Nuclear Research (CERN)

Established in 1953, CERN comprises 12 countries of western Europe engaged in the first experiment in large-scale European co-operation in the field of basic nuclear research. Its program centers in the main around two big machines which will provide unique facilities in Europe for high-energy nuclear research. One of these is like the Berkeley proton synchroton (up till now the most powerful accelerator of this type in the world) but designed to reach energy levels four times as great. It will be in operation by 1960. The other, a synchron-cyclotron, has been operating since 1957.

European Atomic Energy Society

Set up in 1954, this society represents 11 western European countries, but on a different basis from CERN. Its members are the national atomic energy authorities in these countries and their interest is primarily in applied nuclear research.

European Nuclear Energy Agency

Set up in 1954, this agency is a project of the Organization for European Economic Co-operation (OEEC). OEEC represents 17 western European countries with a combined population of more than 280,000,000—more than either the United States or the U. S. S. R. It is concerned with the joint construction of nuclear power stations by the formation of international companies in which interested electric companies would participate.

European Atomic Energy Community (Euratom)

Euratom, covering the six member states of European Coal and Steel Community, was established in 1957 to produce the conditions necessary for the rapid development of nuclear industries, raise the standards of living of those countries and promote commercial exchanges with other countries. In most respects this group is like the European Nuclear Energy Agency of OEEC, with overlapping membership; except that it sets up a fuel supply monopoly for member countries, with exclusive rights to contract for ores, source materials, or special nuclear materials from outside the community. These General Common Market countries abolish import-export duties for nuclear materials and equipment as between themselves, and remove all restrictions based on nationality affecting access to skilled employment.[36]

[35] *Atomic Industrial Report* 4:145 (March 12, 1958) p. 84-85.
[36] *European Year Book*, 1958, Council of Europe, p. 36-64, 386-401.

SUMMARY STATEMENT

The list of governmental agencies whose primary, secondary, or tangential interests involve them in relations with industrial users of nuclear energy and radioactive materials must constitute a challenging problem to all serious students of government. As a representative of the Council of State Governments put it, in summarizing a session of the October Forum conference several times referred to:

> Political scientists are going to have to become physicists and physicists are going to have to become political scientists. The problem of devising necessary and desirable patterns of regulation for the peaceful uses of atomic energy must be faced. . . . The solution to the control pattern involves national organizations, Federal agencies and probably co-operative arrangements between the states themselves. * * *[37]

It will take a vision broad enough to encompass the interrelations which genuinely hold all the way from the local fire department or sanitation district to the International Agency for Atomic Energy.

Appendix H, pages 248-255, lists and describes some important nongovernmental agencies concerned with regulation or development of nuclear energy.

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[37] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 75.

CHAPTER V

STATE ACTIVITIES IN NUCLEAR ENERGY

The 10 states which account for about six-sevenths of the use of radioisotopes, and in which power or testing reactors are being built, will be taken here as those whose experience is likely to be of greatest value to California students of state legislation and regulation of nuclear industry and of related governmental problems. However, the organization of groups of states—in New England and the South—into regional compacts which are pooling resources and aiming at interstate uniformity of atomic energy regulation means that for some matters with which California might be concerned, state political boundaries are artificial and regional activities give a better basis for comparison.

Five tables presented here give the location of civilian full-scale power reactors operating or being built, as of June 30, 1958; the locations in which general testing reactors are operating or being built; the location of critical assembly facilities; the location of AEC's major research and development installations (the great national laboratories and military proving grounds); and the locations of users of AEC-distributed radioisotopes, by states. These five items taken together indicate briefly where in the United States the major portion of atomic energy activity is going forward.

The states, in order of their rank as isotope users, are New York, California, Pennsylvania, Texas, Illinois, New Jersey, Ohio, Massachusetts, Michigan, and Missouri. New York and California together account for about one-quarter of the total number of users, New York users being four and one-half times as numerous as those in the tenth ranking state—Missouri.

As to the location of full-scale civilian power reactors, the list of states again falls within these 10: New York has one, California one, Pennsylvania one, Illinois one, Massachusetts one, and Michigan one. (Of these, only the plant at Shippingport, Pennsylvania, is now operating.)

The location of other nuclear facilities extends the list into other states, but heaviest concentration is still within the 10 mentioned above. California has more reactors operating, being built, and being planned than any other state in the Union, as well as a large share of AEC research and development installations.

This chapter will describe the regulatory and developmental activities of those states and regions in which major nuclear energy work is going forward, and attempt to draw parallels or indicate differences which might be significant to California in planning similar governmental actions.

Table VIII

HIGH TEMPERATURE NUCLEAR REACTORS BUILT, BUILDING, OR PLANNED IN THE UNITED STATES AS OF JUNE 30, 1958 *

(Prototype Civilian Power Reactors)

Name and/or owner	*Location*	*Principal contractor†*	*Power (kw)* Elect. (net)	Therm.	*Start-up*
Operable:					
Shippingport (AEC & Duquesne Light Co.)	Shippingport, Pa.	West	60,000	231,000	1957
Being Built:					
Dresden (Commonwealth Edison Co.)	Morris, Ill.	GE	180,000	626,000	1959
Consolidated Edison	Indian Point, N. Y.	B&W	255,000	500,000	1960
Enrico Fermi (Power Reactor Development Co.)	Lagoona Beach, Mich.	Owner	90,000	300,000	1960
Yankee Atomic Electric Co.	Rowe, Mass.	West	110,000	392,000	1960
Planned:					
AEC & Rural Co-operative Power Association	Elk River, Minn.	ACF	22,000	73,000	1960
AEC & City of Piqua, Ohio	Piqua, Ohio	NAA	11,400	45,500	1961
Hallam (AEC & Consumers Public Power District)	Hallam, Nebr.	NAA	75,000	245,000	1962
Northern States Power Co.	Sioux Falls, S. Dak.	AC	62,000	203,000	1962
Carolinas-Virginia Nuclear Power Associates, Inc.	Parr Shoals, S. C.	West	16,950	60,500	1962
AEC & Chugach Electric Association, Inc.	Anchorage, Alaska	NDA	10,000	40,000	1962
Pacific Gas and Electric Co.	Humboldt Bay, Cal.	GE	50,000-60,000	171,000	1962
East Central and Florida West Coast Nuclear Power Groups	Florida	GNE	46,000	173,000	1963
Pennsylvania Power & Light Co.‡	Allentown, Pa.	West	70,000-150,000	550,000	1963
Gas Cooled Power Reactor (AEC)			30,000-40,000		

* Data excerpted from a table in: Atomic Energy Commission, "Twenty-fourth Semi-annual Report" (July, 1958), p. 335.

† Full names of contractors from column 3 are: Westinghouse Electric Corp.; The Babcock & Wilcox Co.; ACF Industries, Inc.; Atomics International, a Division of North American Aviation, Inc.; Nuclear Development Corp. of America; General Nuclear Engineering Co.; Allis-Chalmers Manufacturing Co.; General Electric Co.

‡ This project was dropped in late 1958.

Table IX-A

GENERAL TESTING REACTORS

Built, Building or Planned as of June 30, 1958 *

Name and Owner	*Location*	*Principal Contractor* †	*Power (kw)*	*Start-up*
Operable:				
Materials Testing Reactor (AEC)	NRTS, Idaho	Fluor	40,000	1952
Engineering Test Reactor (AEC)	NRTS, Idaho	KE	175,000	1957
Oak Ridge Research Reactor (AEC)	Oak Ridge, Tenn.	ORNL	20,000	1958
Being Built:				
General Electric Co. Materials Testing Reactor	Pleasanton, Calif.	Owner	30,000	1958
Westinghouse Testing Reactor	Waltz Mill, Pa.	Owner	20,000	1959
Planned:				
National Advisory Committee for Aeronautics	Sandusky, Ohio	NACA	60,000	1959
Industrial Testing Reactors, Inc.	Wadesboro, N. C.	GE	50,000	1960

* Data taken from: U. S. Atomic Energy Commission, "Twenty-fourth Semiannual Report" (July, 1958), p. 342.
† Full names of contractors from column 3 are: Fluor Corp., Limited; Kaiser Engineers, Division of Henry J. Kaiser Co.; Oak Ridge National Laboratory; National Advisory Committee for Aeronautics; General Electric Co.

Table IX-B

SPECIALIZED TESTING REACTORS

Built, Building or Planned as of June 30, 1958 *

Name and Owner	*Location*	*Principal contractor* ‡	*Power (kw)*	*Startup*
Operable:				
AEC	Hanford, Wash.	DuPont	0.01	1944
AEC	Oak Ridge, Tenn.	ORNL	500	1950
AEC	Schenectady, N. Y.	GE	10	1951
AEC	Savannah River, S. C.	DuPont	1	1953
AEC	Savannah River, S.C.	DuPont	1	1953
AEC	Savannah River, S. C.	DuPont	1	1953
USAF	Ft. Worth, Tex.	Convair	500	1953
AEC	Oak Ridge, Tenn.	ORNL	500	1954
USAF	Oak Ridge, Tenn.	Convair	1,000	1954
AEC	Hanford, Wash.	GE	10	1955
AEC	NRTS, Idaho	PPC	--	1955
AEC	Santa Susana, Calif.	NAA	50	1956
GE	Pleasanton, Calif.	GE	30	1957
Being Built:				
AEC	NRTS, Idaho	PPC	--	1958
AEC	NRTS, Idaho	PPC	60,000	1958
USAF	Dawsonville, Ga.	Lockheed	10,000	1958
AEC	NRTS, Idaho	ANL	100	1959
USAF	Dayton, Ohio	ACF	10,000	1959
AEC	Hanford, Wash.	GE	70,000	1960
AEC	NRTS, Idaho	GE	100	1958
AEC	Oak Ridge, Tenn.	ORNL	5,000	1959
Planned:				
AEC	Savannah River, S. C.	DuPont	62,000	1961

* Data taken from: U. S. Atomic Energy Commission, "Twenty-fourth Semiannual Report" (July, 1958), p. 342.
‡ Full names of contractors from column 3 are: E. I. DuPont de Nemours Co.; Convair Division of General Dynamics Corp.; Phillips Petroleum Co.; Atomics International, a Division of North American Aviation, Inc.; Lockheed Aircraft Corp.; Argonne National Laboratory; ACF Industries, Inc.

Table X

CRITICAL ASSEMBLY FACILITIES IN THE UNITED STATES

As of June 30, 1958 *

Name and location of facility	*Operator*
Allis-Chalmers Critical Experiment Facility, Greendale, Wis.	Owner
Alco Products, Inc., Schnectady, N. Y.	Owner
Argonne National Laboratory (AEC), Lemont, Ill.	ANL
Argonne National Laboratory, Idaho Div., (AEC), NRTS, Idaho	ANL
Bettis Plant (AEC), Pittsburgh, Pa.	Westinghouse
The Babcock & Wilcox Co., Lynchburg, Va.	Owner
Battelle Memorial Institute, West Jefferson, Ohio	Owner
Brookhaven National Laboratory (AEC), Upton, N. Y.	BNL
Connecticut Aircraft Nuclear Engine Laboratory (AEC), Middletown, Conn.	P&W (Pratt & Whitney)
Nuclear Engine Laboratory of Combustion Engineering, Inc., Windsor, Conn.	Owner
Engineering Test Reactor Critical Facility (AEC), NRTS, Idaho	PPC (Phillips Petroleum Co.)
General Electric Co., Vallecitos Laboratory Experimental Physics Facility, Pleasanton, Calif.	Owner
Evendale Critical Experiment Facility (AEC), Evendale, Ohio	GE
General Dynamics Corp., San Diego, Calif.	Owner
Knolls Atomic Power Laboratory (AEC), Schenectady, N. Y.	GE
Lockheed Aircraft Corp., Dawsonville, Ga. (USAF)	Owner
Los Alamos Scientific Laboratory, Los Alamos, N. M.	LASL
Low Power Test Facility (AEC), NRTS, Idaho	GE
The Martin Co., Middle River, Md.	Owner
Lewis Flight Propulsion Laboratory, Sandusky, Ohio	Owner
Nuclear Development Corporation of America, Pawling, N. Y.	Owner
Oak Ridge National Laboratory Critical Facility (AEC), Oak Ridge, Tenn.	ORNL
Pool Critical Assembly, BSR Pool (AEC), Oak Ridge, Tenn.	ORNL
Physical Constants Test Reactor Facility (AEC), Hanford, Wash.	GE
Reactivity Measurements Facility, MTR Canal (AEC), NRTS, Idaho	PPC
Westinghouse Reactor Evaluation Center Critical Experiment Station (CES) and Yankee Critical Facility (YCF), Waltz Mill, Pa.	Owner

* Excerpted from the Atomic Energy Commission, "Twenty-fourth Semiannual Report" (July, 1958), p. 344.

Table XI

MAJOR RESEARCH AND DEVELOPMENT INSTALLATIONS OF THE U. S. ATOMIC ENERGY COMMISSION [1]

Name	*Contractor*	*Location*
California		
University of California at Los Angeles, Atomic Energy Project	University of California	Los Angeles
University of California, Medical Center, Radiological Laboratory	University of California	San Francisco
University of California Radiation Laboratory	University of California	Berkeley
Idaho		
National Reactor Testing Station (NRTS)		Idaho Falls, Idaho
Illinois		
Argonne Cancer Research Hospital	University of Chicago	Chicago, Ill.
Argonne National Laboratory	University of Chicago	Lemont, Ill.
Iowa		
Ames Laboratory	Iowa State College	Ames, Iowa
Marshall Islands		
Eniwetok Proving Ground		Marshall Islands
Massachusetts		
Raw Materials Development Laboratory	National Lead Co.	Winchester, Mass.
Nevada		
Nevada Test Site		Las Vegas, Nev.
New Mexico		
Los Alamos Scientific Laboratory	University of Cailfornia	Los Alamos, N.M.
Sandia Laboratory	Sandia Corp.	Sandia Base, Albuquerque, N.M.
New York		
Brookhaven National Laboratory	Associated Universities, Inc.	Upton, Long Island, N.Y.
Knolls Atomic Power Laboratory	General Electric Co.	Schenectady, N.Y.
Pennsylvania		
Bettis Plant	Westinghouse Electric Corp.	Pittsburgh, Pa.
Tennessee		
Oak Ridge Institute of Nuclear Studies	Oak Ridge Institute of Nuclear Studies	Oak Ridge, Tenn.
Oak Ridge National Laboratory	Union Carbide Nuclear Co.	Oak Ridge, Tenn.

[1] Data taken from: Atomic Energy Commission, "Twenty-fourth Semiannual Report" (July, 1958), pp. 291-94.

Table XII

LOCATION AND TYPE OF USERS OF RADIOSIOTOPES DISTRIBUTED BY THE ATOMIC ENERGY COMMISSION *

(February 10, 1956 to May 31, 1958)

States and territories	*Medical institutes and physicians*	*Colleges and universities*	*Industrial firms*	*Federal and state laboratories*	*Foundations and institutions*	*Other*	*Total*
New York	255	21	150	30	4	5	465
California	180	9	149	27	3	4	372
Pennsylvania	85	15	130	28	2	0	260
Texas	113	8	87	17	3	1	229
Illinois	96	18	89	17	5	2	227
New Jersey	62	4	104	11	1	2	185
Ohio	88	9	67	11	4	0	179
Massachusetts	48	24	75	7	6	2	162
Michigan	67	8	45	11	3	1	135
Missouri	52	8	16	11	1	4	92
Other states and territories	688	117	422	183	11	24	1,444
Total	1,734	241	1,334	353	43	45	3,750

* Data taken from: Atomic Energy Commission, "Twenty-fourth Semiannual Report" (July, 1958), pp. 291-94.

NEW ENGLAND STATES

Public and private representatives in the New England states—Maine, Vermont, New Hampshire, Massachusetts, Connecticut, and Rhode Island—collaborated in 1954 in a year of study, utilizing two well developed institutions for regional action, the New England Council and the New England Governors' Conference, and establishing a new one—the New England Committee on Atomic Energy. As a result, by July, 1955, they had recommended to the governments of the New England states the adoption of legislation along the lines of a draft act prepared by their subcommittee on education and legislation—an act which the Council of State Governments adopted in 1957 for inclusion in its program for suggested state legislation, and which served as the model for California's Assembly Bill No. 975, the Chapel bill. The New England committee also asked their congressional representative to co-operate in bringing about early atomic power development in the region. They urged New England educational institutions to develop active relations with the nearest AEC national laboratory; to install at least four low-powered research reactors on New England campuses; and to introduce into existing curricula material and training to increase understanding and attract capable talent in the field of atomic energy. They urged New England industrial and business leaders to help locate a material-testing reactor in the region, and to work closely with New England educational institutions and the AEC.

This initial push, so soon after the passage of the 1954 Atomic Energy Act, has had results.

> New England had several natural advantages to begin with. It is heavily industrialized, with well-developed electronics, chemical and metallurgical sectors, and with a supply of the scientific and engineering talent required by atomic energy development. AEC's Brookhaven National Laboratory is nearby, on Long Island, operated by Associated Universities, Inc., which includes Harvard, Yale

and MIT; and AEC's Raw Materials Development Laboratory is located at Winchester, Mass.

New England has received a generous proportion of AEC contracts and subcontracts for research and development, architect-engineering services, materials, supplies and equipment. Its military contracts include the building of atomic submarines by General Dynamics' Electric Boat Division at Groton, Conn., and at the Navy Shipyard at Portsmouth, N. H.; a study by Bethlehem Steel Corp. at its shipyard at Quincy, Mass., of atomic propulsion of surface vessels; and a contract with Pratt & Whitney Division of United Aircraft Corp. for nuclear aircraft propulsion research and development, which will be carried out in the $30 million laboratory it is building near Hartford, Conn.

Radioisotope use in the six states about equals that of California. Tracerlab, Inc., whose parent office is in Waltham, Mass., has pioneered in preparing and distributing radioactive materials for use in industry, science, medicine and agriculture.

Instrumentation and supply of components for reactors are important activities in New England: High Voltage Engineering Corp. of Cambridge, Mass., delivered 35 particle accelerators valued at $5.75 million during 1958; Nuclear Metals of Cambridge (a subsidiary of Arthur D. Little, Inc.), Norton Co. of Worcester, Clevite Corp. of Waltham, and Metals and Controls Co. of Attleboro, Mass., prepare and fabricate nuclear fuels; and Arthur D. Little has a number of AEC research and development contracts into industrial applications of high-level radiation.

Private utility companies responsible for about 90 percent of the electric supply of the region have formed the Yankee Atomic Electric Co., which is constructing a 110,000-kilowatt power reactor near Rowe, Mass., due to start operating in 1960. MIT has a research reactor for theoretical research and teaching purposes; Arthur D. Little has announced intention to build a large materials testing reactor; and the New England Electric System is investigating the possible construction of a 200,000-kilowatt power reactor plant by 1964. Rhode Island voters in 1958 approved the construction of a research reactor to be owned and operated by the state (the contract for which has been awarded to General Electric).[38]

All the New England states except Vermont have adopted substantial parts of the Model Act, but an examination of the implementation of the act shows that it is unsafe to conclude from it any uniformity of regulatory philosophy or practice. In Maine and New Hampshire, which have little atomic industry, the legislation has been but a token gesture. In Maine the co-ordinator is part-time and uncompensated, and in New Hampshire the title has been conferred on the chairman of the public utilities commission, who reports that there has been no occasion for any activity but the public health department check on hospitals and other agencies using radioactive materials. In Rhode Island no co-ordi-

[38] Much of this data is taken from New England Committee on Atomic Energy, *Atomic Energy and New England: Report* (July, 1955). It is supplemented by data from various trade journals and other sources.

nator has been appointed.[39] Connecticut and Massachusetts, which contain the bulk of the New England atomic industry, have taken different roads toward its regulation and development.

Connecticut

In Connecticut a part-time co-ordinator serves without salary or staff. Twenty dollars a day is allowed for those days actually devoted to his duties as co-ordinator, and a budget of $7,500 was passed for 1958-1959. The co-ordinator is a lawyer with experience in business, legal, and governmental affairs, with purely liaison and advisory powers. He does not propose or recommend legislation, rules, or regulations.

A nine-member, governor-appointed Advisory Committee on Atomic Energy consists of representatives from industry, medicine, education, and labor, with the co-ordinator as chairman.

One hundred thousand dollars has been appropriated to enable the University of Connecticut to study the establishment of a nuclear training and research center.

The Connecticut Department of Health requires annual registration of radiation sources, exempting, however, X-rays under the supervision of licensed practitioners (which includes chiropractic, naturopathic, osteopathic, and veterinary practitioners). It also exempts certain low-level radiation equipment and naturally occurring radioactive materials, and transporters of radioactive material under ICC jurisdiction.[40] The health department's comprehensive sanitary code covers matters handled in California by our Division of Industrial Safety in the Department of Industrial Relations, but is spelled out in a far more specific code than is the case in California.[41]

The Commissioner of State Police is required by legislative act to make "reasonable regulations concerning the safe storage and transportation of hazardous chemicals," which include radioactive materials; and the local fire marshal of each town, city, and borough is required by the same act to inspect all storage plants, equipment, and vehicles in his jurisdiction and "report promptly" to the state police commissioner any hazard found.[42]

Under consideration, but not yet adopted, are legislative measures prohibiting fluoroscopic shoe-fitting devices, amendment of the Workmen's Compensation Act, and setting maximum yearly, quarterly, and lifetime dosages for persons transporting radioactive materials in the state.

Massachusetts

The part-time co-ordinator in Massachusetts, who is a member of the Department of Commerce, receives his salary from that department, and $25 a day for time spent on co-ordinator's duties, plus reimbursement for necessary expenses. He is chairman of a six-man, governor-

[39] Arthur L. Quirk, University of Rhode Island, is chairman of the Rhode Island Atomic Energy Commission appointed in 1955.

[40] Connecticut. Laws. *An Act Concerning the Control of Sources of Ionizing Radiation for the Purpose of Protecting Public Health* (Public Act no. 154; approved May 1, 1957).

[41] Connecticut. State Department of Health, *Sanitary Code: Radiation Sources and Radioactive Materials* (August 22, 1957).

[42] Connecticut. Laws. *An Act Concerning Storage and Transportation of Hazardous Chemicals* (Public Act no. 353, Acts of 1957; effective October 1, 1957).

appointed commission with five-year terms, members of which serve without compensation. They represent industry, education, and labor.

Auxiliary to this lay commission, and established under its general guidance, is a "Radiation Co-ordinating Committee on Atomic Energy," consisting of 18 state agencies and departments.

A third, 11-member commission, set up in May, 1957, by legislative resolve, was instructed to study the establishment in Massachusetts of an atomic energy industrial research center, rendering a report not later than December, 1958.

The Massachusetts Atomic Energy Commission was one of six organizations co-sponsoring an "Atomic Energy Day of the Citizens' Participation Program" held in Boston in November, 1957, with sections on atomic power, law, radiation and health, radioisotopes, insurance, and new instruments and materials.

On the regulatory side, the department of labor and industries requires registration of every industrial radiation installation.[43]

The State Department of Public Health is authorized to regulate handling and disposal of radioactive materials, but the act is not intended to "prevent the State Department of Labor and Industries from establishing rules and regulations" to safeguard employees in any place of employment from radiation.[44]

Chapter 453, Laws of 1957, approves the issuance of nuclear insurance by syndicates of stock or mutual companies, becoming effective June 21, 1957; and Act No. 117, Laws of 1956, effective July 25, 1956, directs the State Judicial Council to study liability in torts arising from the lawful uses of radioactive or fissionable material.

Chapter 79, Laws of 1958, prohibits the operation or maintenance of a "shoe-fitting device or machine which uses fluoroscopic, X-ray, or radiation principles" except "by or under the direction of a physician or chiropodist registered" in the state.

The Department of Public Health, pursuant to Chapter 94, Resolves of 1957, has issued a "Report on Regulatory and Protective Measures Pertaining to Radioactive Materials," dated December 30, 1958. The study revealed that there are approximately fifty departments, divisions, and agencies in Massachusetts with primary, secondary, or fringe interests in the control of ionizing radiation. The chart representing these interests and the agency involved is reproduced on pages 94 and 95. The report also contains several recommendations to the legislature, as follows:

A. Continue co-ordination of activities of various departments to prevent duplication of functions, to "minimize confusion and inconvenience to the users of sources of ionizing radiation, and to accomplish an adequate control program based upon the existing state structure.

B. Register all sources of ionizing radiation.

[43] Massachusetts. Department of Labor and Industries, *Rules and Regulations for the Protection of the Health and Safety of Employees from Occupational Diseases Caused by Ionizing Radiations* (effective December 1, 1957).

[44] Massachusetts. Acts, 1955, Ch. 335 (effective August 4, 1955).

C. * * * determine the wisdom (and the most appropriate and feasible method) of divorcing the responsibilities of promotion and development from those of co-ordination of state activities in the field of atomic energy.

D. Attain adequate staffing and training of personnel; secure necessary equipment and facilities for the departments and agencies of the State * * * concerned with the regulation and control of ionizing radiation; and effect * * * budgets to accomplish this end.

E. Establish a central laboratory facility for the conduct of all radioassays for all state agencies. * * *

F. Enact * * * legislation * * * which would:
1. Protect employees of the Commonwealth from claims against them arising out of their use of hazardous materials and sources of ionizing radiation * * *;
2. Authorize the Department of Public Health to regulate *all* sources of ionizing radiation * * *; and
3. Require the approval by the Department of Public Health of regulations pertaining to health aspects of ionizing radiation adopted by any agencies, departments, or political subdivisions of the Commonwealth of Massachusetts. * * *

G. Establish an interdepartment service within the state to assist local agencies in dealing with accidents or other emergency situations involving radioactive materials.

H. * * *

I. * * *

The reason advanced for the indemnification legislation is as follows:

> * * * state employees are now required as part of their regular duties to handle hazardous materials and operate sources of ionizing radiation. * * * The probability of claims being entered *against the employee* (since the sovereign is immune from suit) by individuals claiming damage arising from acts of such employees, or from the radiation they control, cannot be ignored.

Rhode Island

Although Rhode Island has appointed no co-ordinator, it is the first state to have passed legislation authorizing state ownership and operation of a nuclear reactor. A November, 1958, referendum measure approved the construction of a state-owned and operated nuclear power plant, authorizing the issuance of state bonds not to exceed one million dollars for the purpose. The state Atomic Energy Commission is authorized to contract for, construct, and operate the reactor.[45] A years-end release by Atomic Industrial Forum, Inc., states that plans have been announced "for a reactor of unspecified type to be built by General Electric for the State of Rhode Island."[46]

[45] *State Tax Review*, November 17, 1958.
[46] Atomic Industrial Forum, Inc., *News Release* (December 24, 1958).

Before dealing with the states in the southern regional compact, we shall present the activities of five states, each of which is roughly comparable to California in the scope of its atomic energy industry—New York, New Jersey, Pennsylvania, Ohio, and Illinois.

NEW YORK STATE

New York has the largest radiation industry of any state in the Union. Of the 33 private contractors, designers, and facility operators listed by the AEC in 1958, as currently involved in planning, building, or operating nuclear facilities,[47] eight have New York headquarters—Alco Products, Inc., AMF Atomics (a division of American Machine & Foundry Co.), The Babcock & Wilcox Co., Combustion Engineering, Inc., Foster Wheeler Corp., General Electric Co., Nuclear Development Corp. of America, and Vitro Engineering Co. (a subsidiary of Vitro Corporation).

The state also has AEC's Brookhaven National Laboratory, and Knolls Atomic Power Laboratory, and the Clinton Laboratory and Metallurgical Laboratory of Manhattan Engineering District.

One large commercial power reactor is under construction—Consolidated Edison's plant at Indian Point in Westchester County; the reactor for *N.S. Savannah* is being built by Babcock & Wilcox and the New York Shipbuilding Corp.; two reactors are being built by General Electric at West Milton, N. Y., for propulsion of large destroyers; and American Machine & Foundry has built and is building a number of research reactors, both for domestic customers and abroad. Critical facilities are being operated in New York State by Alco Products, Nuclear Development Corp., and of course Brookhaven National Laboratory and Knolls Atomic Power Laboratory. Two industrial organizations and several universities and medical institutions received in 1958 sources of radiation in excess of 100 curies each for irradiation service; and Babcock & Wilcox, Combustion Engineering, Nuclear Development Corp. of America, and Sylvania-Corning Nuclear Corp. are in the business of preparing and fabricating nuclear fuels.[48]

Three hundred and eighty firms are registered with New York's Department of Labor as users of some type of ionizing radiation, and approximately 400 others—hospitals, colleges, universities, and research institutes—are registered with the State Health Department. The latter registrants do not include those located within New York City,[49] which has 30,000 doctors, dentists, institutions, and business concerns believed to have X-ray machines, radioactive isotopes, or other radiation-emitting equipment.[50]

With all this activity, it is not surprising that New York was the first to institute some sort of operating program in atomic energy, and it is interesting that it has not to date provided for any one co-ordinating agency in the state. It has had since October, 1955, a governor-appointed Council on the Use of Nuclear Materials, consisting of the commissioner of commerce, chairman, the commissioners of health and

[47] Atomic Energy Commission, Twenty-fourth Semiannual Report (July, 1958), p. 333.
[48] Atomic Industrial Forum, Inc., *News Release* (December 24, 1958).
[49] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 50.
[50] New York City. Department of Health, *News Release* (September, 1958).

industry, and a public service commissioner, with four technical or professional men as alternates. Since August, 1956, it has had a governor-appointed Atomic Energy Advisory Committee composed of some 24 persons in science, industry, labor, and education.

Governor Nelson Rockefeller's message to the legislature in January, 1959, recommended "establishing within the executive department, responsible to the governor, an agency to plan and co-ordinate atomic development and regulation within the state and to recommend needed changes in state laws." Duties would be to collect and disseminate nuclear information and to co-operate with appropriate agencies of the federal and other state governments and with private atomic enterprise. It would sponsor studies to develop atomic energy within the state, encourage nuclear projects by private industry, and further nuclear research and education.[51]

Both the health [52] and labor [53] departments have adopted comprehensive codes regulating atomic energy. Registration of all industrial radiation installations is required with the department of labor, while all medical-type installations and other establishments not subject to supervision by the department of labor must register with the department of health.

Complicating the regulatory picture in some respects is the fact that New York City has adopted comprehensive atomic energy control legislation. All radiation sources must be registered with the city department of health—those which are under the supervision of the AEC or of the state department of labor being exempt, however, from other provisions of the city code.

In December, 1956, the commissioner of commerce announced that the Council on the Use of Nuclear Material had decided that "because of the special considerations involved in the operation of a nuclear power plant, inspections *within* such plants would be made by labor department personnel and reported to the Public Service Commission, while outside inspections—affecting the environmental safety of the surrounding area—will be made by the health department," [54] thus solving a rather complicated jurisdictional problem.

Chapter 39, Laws of 1957, amends Section 225 of the Public Health Law to provide that the State Sanitary Code may "prescribe the qualifications of * * * radiation safety officers * * *."

As for state legislation affecting other departmental areas, radiation hazards incident to building construction are subject to control in Section 501 and Section C514-1 of the State Building Code. Administration and enforcement of this code "are the responsibility of the local municipality," and as of May 28, 1957, 217 of these had adopted the code.

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[51] *New York Times* (January 8, 1959).

[52] New York State. Department of Health, *Sanitary Code*, Ch. 16: "Ionizing Radiation" (effective September 1, 1955). Amended September 1956 to make more uniform with technical provisions in the State Department of Labor Code Rule no. 38. Amended further on February 20, 1957, to add a regulation which in effect bans the use of X-ray shoe-fitting fluoroscopes by requiring that only persons "licensed or otherwise authorized to practice medicine, dentistry, podiatry or osteopathy" can apply radiations to humans.

[53] New York State. Department of Labor, *Industrial Code Rule no. 38*, "Radiation Protection" (effective December 15, 1955).

[54] Atomic Industrial Forum, Inc., *State Activities in Atomic Energy* (July, 1958), p. 22.

Section 16 of the New York State Motor Vehicle Law regulates transportation of radioactive materials "when transported as cargo by motor vehicle on a highway, requiring conspicuous marking of such vehicles; but does not apply to articles conforming to regulations of the ICC. Section 6508 of the State Unconsolidated Laws prohibits transportation by any person of "any radioactive article, substance, or material" in a manner endangering persons or property unreasonably; and Section 6521 gives the Port of New York Authority the power to enforce "Rules and Regulations Applicable to Air and Marine Terminal Highways," which cover, in Rule No. 7, radioactive materials.

The water pollution and the air pollution control boards are "cued in" by health and labor departments "on all problems which may affect their agencies"; while the executive secretary of the Governor's Advisory Council on the Use of Nuclear Material acts as clearing house for work with local fire departments—keeping them informed as to potential radiation hazards in their areas, arranging meetings between company and fire department representatives, and performing similar liaison work with other departments of state and local government.[55]

The department of labor has had two three-day conferences on radiological safety to help company officials responsible for industrial health and safety, plant and product engineering, personnel relations, research and insurance to solve the control problems associated with their work; and has published several technical articles on radiation hazards and a report of its experience in administering its radiation code. The health department has also published and held meetings on radiation protection.

As for promotional or developmental activities, the New York State Department of Commerce has sponsored two conferences to promote use and understanding of radiation and radioisotopes by industry, and has issued a promotional booklet, *Atomic Energy for Small Business.*

The 1958 Legislature passed a bill to establish a nuclear research center on the Niagara Frontier, but it was vetoed. Governor Rockefeller recommends its repassage.

Bills are being prepared for the legislature to include nuclear activities within the authority of the State Power Authority, which is considering the possibility of building, owning, and operating a 400,000-500,000-kilowatt power plant near Sodus Bay on Lake Ontario.

NEW JERSEY

New Jersey's atomic energy industry is heavily weighted toward radioisotope use, particularly in manufacturing. It ranks sixth in AEC-produced byproduct shipments.

It has no power reactors, test reactors, or critical facilities, and comparatively few research and training reactors. Industrial Research Laboratories, Inc., has one for its own use at Plainboro, and there may be others.

The AEC has a small investment in a laboratory in New Brunswick and in the Pickatinny Arsenal Ordnance Facility at Dover; and is underwriting a large part of the enormous costs of Princeton University's "stellarator" and related devices which will perform experiments

[55] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 50.

in thermonuclear research. Appendix D, pages 234-237, describes what is meant by thermonuclear "Fusions" power.

Davison Chemical Company of Pompton Lakes completed in 1958 its facilities for the preparation of thorium fuel; and Gulton Industries, Inc., of Metuchen and Engelhardt Industries of Newark, prepare and fabricate nuclear fuel.

Since the fall of 1956 New Jersey has had an Atomic Energy Study Commission consisting of 15 members, five appointed by the governor, five by the president of the state senate, and five by the speaker of the state assembly, with a state senator as chairman. Even before that, in March, 1955, the governor had appointed a 12-member Advisory Committee on Radiation Protection consisting of technical advisors to the department of labor and industry plus additional state officials and consultants.

Transportation of radioactive materials on the highways has been subject to regulation since 1950, and the department of health has been authorized to promulgate regulations to control radiation sources since 1952.

New Jersey is the only state so far to adopt an act modeled after one proposed as the outcome of study by committees on radiological health of the American Public Health Association, the Special Committee of the Conference of State Sanitary Engineers, and a committee of the Association of State and Territorial Health Officers. It is commonly referred to as the American Public Health Association Act, and was issued in 1958 in two versions, one with and one without a commission, but both placing authority and responsibility for atomic energy regulation in the health department.

The New Jersey act creates a commission *within the department of health*, consisting of five members with scientific training in medicine, radiology, radiation physics, atomic energy, biology, or engineering. Its members are appointed by the governor with the advice and consent of the senate, the commissioners of health and of labor. It is thus a group of technical experts advisory to the health department in its administration of regulations governing atomic energy. They serve a four-year term, without compensation, but are reimbursed for necessary expenses.

The commission has power to adopt and repeal codes, rules, and regulations, but only after a public hearing. Registration of sources is required with the department of health, which also inspects locations and operations. No ordinance or regulation on radiation adopted by cities, counties, or local boards of health may become effective until approved by the commissioner and shown to be consistent with the state codes.

PENNSYLVANIA

The one operating central station power reactor in the U. S. is at Shippingport, Pa. Westinghouse is building a large test reactor in the state, and AEC had received a proposal for a high temperature 30,000-60,000 reactor, from Philadelphia Electric Company (together with a group of utilities known as High Temperature Reactor Development Associates), to be located at Peach Bottom, Pennsylvania.

AEC's own facilities in the state include its Bettis Plant in Pittsburgh (which contains a naval reactor facility) and research facilities at Carnegie Institute of Technology, also in Pittsburgh.

Penn State University has a research and training reactor at University Park, Curtiss-Wright has one at Quehanna, and there may be others.

Pennsylvania ranks third in radioisotope shipments from AEC, and is the home state of a number of industries making use of isotopes.

Nuclear Materials and Equipment Corporation prepares and fabricates uranium and thorium fuel for reactors. Beryllium Corporation, which supplies reactor-grade beryllium for the AEC and for private industry, has a new plant near Reading. Daystrom, Inc., is contractor for the medical reactor being built at Brookhaven National Laboratory. Westinghouse does a large part of the naval propulsion reactor business for the Navy, although it builds them in Connecticut for the most part.

With all this, Pennsylvania has adopted a comprehensive radiation code, but has no statewide advisory or co-ordinating agency in the field. Regulation is accomplished by the health department, which requires written notification by owners or operators of any radiation source. It announced over a year ago—December 31, 1957—that such users numbered 6,599. In connection with the operation of the Shippingport reactor, the department of health is conducting a monitoring program to evaluate the total environmental effect of the power plant. The state sanitary water board permits the Duquesne Light Company, operator, to dispose of 12,000 gallons per day of waste water containing approximately 10 curies of tritium and 1590 microcuries of other radioactive materials, provided very careful conditions are met, in compliance with the State Radiation Protection Regulation 433.

Shoe-fitting flouroscopes are banned. The state registration board of professional engineers has set up an examination to license nuclear engineers.

Transportation of radioactive materials is prohibited on the Pennsylvania Turnpike unless a special permit is granted by the Turnpike Commission unless they conform to ICC regulations, and is categorically prohibited from the eight tunnels of the Turnpike system.

At last report, July, 1958, no legislative action was under contemplation.

OHIO

The AEC has invested considerable sums in plant and equipment in Ohio which, as in California, has given the state a head start in atomic energy activities. There is its mammoth gaseous diffusion plant at Portsmouth; the feed materials production facilities at Fernald; the Mound Laboratory operated by Montsano Chemical Co. at Miamisburg; the aircraft nuclear propulsion project operated by General Electric Co. at Lockland; and the beryllium production plant at Luckey.

A power reactor has been under construction for the city of Piqua, but following a tentative decision by the AEC's Advisory Committee on Reactor Safeguards that the proposed site is not suitable, work has

been suspended. However, the project is still under consideration, and Senator Bricker of Ohio has recently stated that it will be resumed, either at the present site or at another in the area. [56]

Construction is also proceeding on a test reactor at Sandusky for the National Advisory Committee for Aeronautics, after an administrative hearing on its safety aspects. The U. S. Air Force has a specialized test reactor at Dayton. Battelle Memorial Institute in Columbus, and General Electric Company at Evendale, have critical facilities.

Case Institute of Technology in Cleveland has a particle accelerator, and Battelle and the University of Akron have research and training reactors.

Ohio is close enough to the Argonne National Laboratory at Lemont, Illinois, to make good use of it, and many Ohio universities have joined a nonprofit corporation called Associated Midwest Universities, with 26 member universities and research units, to create a reservoir of scientific manpower, using Argonne Laboratory as its center for basic research.

Ohio ranks seventh in AEC shipments of radioactive isotopes and has a generous supply of industries making use of them.

In 1957 the Legislature passed a version of the model bill proposed by the New England Committee, providing for an atomic energy advisory board, establishing the position of co-ordinator, and requiring the several state departments and agencies to make certain studies and recommendations. The full-time co-ordinator, with a stipulated salary of $12,000, is appointed by the governor and serves as secretary of the 11-member advisory board, also governor-appointed, with members representing labor, management, medicine, and scientific training related to atomic energy. They serve without compensation. Proposed atomic energy regulations need not be submitted to the co-ordinator or advisory board for approval before adoption.

A trained engineer who had been with the division of industrial safety is attached to the co-ordinator's office, for joint AEC inspections and technical advice. Although registration of users of ionizing radiations is not required, the state believes it has located all users. Records of these locations are on IBM cards and are distributed to the several interested state departments and to local fire and police units. With the help of the AEC, fire personnel have been given training in radiological fire fighting. The highway patrol has assigned a liaison officer to the co-ordinator's office to handle relevent nuclear affairs, and a special manual, geared to the policeman, has been prepared and distributed. Shoe-fitting fluoroscope machines are prohibited as of May, 1958, unless used by physicians and chiropodists. A recommendation by a subcommittee of the advisory board that a statewide radiation code be set up was set aside in July, 1958, for further study.

Ohio has a co-ordinated plan with the Chicago operations office for action in the event of a major accident, and is currently compiling a list of physicians who could handle radiation cases, and notifying local authorities where they can be located.

On the developmental side, the co-ordinator has been very active. A one-page information bulletin is sent monthly to a wide mailing list.

[56] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January 1959), p. 77.

and community groups are encouraged to educate their membership on the peaceful uses of atomic energy. Ohio has been host to a number of atomic energy conferences, both statewide and national, the latest one held in Columbus in October, 1958, under the sponsorship of the Atomic Industrial Forum—centering on the impact of the peaceful uses of atomic energy on state and local government.

ILLINOIS

Argonne National Laboratory in Lemont, about 25 miles southwest of Chicago, has carried a great share of the AEC's nuclear reactor program and its research on peacetime uses of atomic energy. The laboratory has an operating power reactor, several research reactors, several critical facilities, and a particle generator. Argonne Cancer Research Hospital in Chicago is another AEC installation; and the University of Chicago—scene of Fermi's achievement of the first self-sustaining nuclear chain reaction—receives AEC support for its nuclear research and experimentation.

Commonwealth Edison's Dresden plant, a 180,000-kilowatt unit, is expected to be in service by 1960, at Morris.

Armour Research Foundation in Chicago has a research reactor. Armour & Co. is one of the firms composing Irradiated Products, Inc., which has the contract with the Army Quartermaster Corps for production planning of the Army Ionizing Radiation Center in California.

Illinois is fifth in shipments of AEC-distributed radioisotopes—227 to California's 372, as of July, 1958.

Illinois has no overall atomic energy law, but an Atomic Power Investigating Commission set up by the General Assembly in July, 1955, issued a report in March, 1957, recommending that further study be given to the most desirable form of state activity, with definitive recommendations to be made to the 1959 Legislature. In the meantime, it recommended that the health department be empowered to require registration of radiation sources in the State. This recommendation was implemented by a measure passed in the 1957 Assembly requiring registration of, and authorizing the health department to investigate and inspect, all radiation installations. Any changes in inventory of radiation sources must be reported to the department. A certificate of registration is issued to the operator after review indicates that the information is acceptable. Failure to register is punishable by a fine of $1,000 and six months in jail, each day of failure constituting a separate offense. Operation of an unregistered installation may be enjoined by the state courts on application of the attorney general. These provisions make Illinois' registration the most stringent of any in the states.

THE SOUTHERN STATES COMPACT

A 23-member Regional Advisory Council on Nuclear Energy, with headquarters in Atlanta, Georgia, was established in 1957 under a mandate from the 1956 Southern Governors' Conference as the first agency of its kind in the Nation. It serves as a clearinghouse for nuclear information to state governments, conducts a public education program, co-ordinates studies on nuclear problems, and works with the Southern Regional Education Board and other groups in dealing with educational aspects of nuclear energy. Contributions of $5,000 from each

state gave the council an $80,000 operating budget for the first two years. Sixteen of its members are the state governors, the remaining seven being members-at-large representing agriculture, education, industry, medicine, power, and public health. Its chairman is director of the South Carolina State Development Board. Its representatives have journeyed to Washington, D. C., for closed-door meetings with the Joint Committee on Atomic Energy and the AEC, primarily to express a states' rights viewpoint in regard to inspection activities and other activity in the atomic energy field.

Under its stimulus a number of state committees have also been formed to recommend atomic energy legislation and to develop health and safety codes on radiation.

In September, 1958 the Southern Governors' Conference approved the creation of an interstate compact. Official existence of this new governmental agency awaits ratification by each state legislature and the Congress.

States to be covered by the pact are Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

On the legal status of the interstate compact, the research director of the New York Joint Legislative Committee on Interstate Co-operation recently said:

> Because of these attributes, the compact has been the accepted legal vehicle for the creation of joint administrative agencies of two or more states. Its effectiveness for this purpose is evidenced by the fact that practically all such interstate agencies have been established by interstate compact.
>
> * * * * *
>
> The compact is a particularly flexible device. First, it can apply to all levels of government; can apply to the Federal, to the state, to the local and also could be used as a means by which a state could become party to an international agreement. Secondly, it provides with its federal stature a single pattern of law in an area. Third, it is the only constitutional instrument for regional organization. And, fourth, its legal characteristics and its pervasiveness permit it to be tailored to fit any situation.[57]

Such an integrated regional agency dedicated to the encouragement of nuclear industry is sure to improve the South's competitive position *vis-a-vis* the rest of the country; and the South, taken as a region, already has an impressive array of nuclear activities.

The AEC's headquarters are in Maryland; its Oak Ridge National Laboratory, gaseous diffusion plant, and Institute of Nuclear Studies are in Tennessee, and it contributes to the support of the agriculture research laboratory and farm of the University of Tennessee. Two other big gaseous diffusion plants are at Paducah, Kentucky, and Savannah River, South Carolina.

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[57] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 79-71.

The Army's Package Power Reactor was built at Fort Belvoir, Virginia. AEC has plant and equipment in the Huntington pilot plant of the International Nickel Co. in West Virginia, as well as at Clearwater, Florida, where General Electric operates the Pinellas plant. The Navy has a nuclear submarine and surface vessel-building program in Newport News, Virginia.

There are testing reactors, general or specialized, at Oak Ridge (four), Savannah River (three, and one more planned), Fort Worth, Texas (one), and Dawsonville, Georgia (one—Lockheed Aircraft's); and Industrial Testing Reactor's $12 million facility is going up at Wadesboro, North Carolina.

There are critical facilities operated by Oak Ridge in Tennessee, Babcock & Wilcox at Lynchburg, Virginia, The Martin Co. at Middle River, Maryland, and Lockheed at Dawsonville.

Most of General Dynamics' Convair Division operations on aircraft propulsion are carried out in Texas.

There are research and training reactors at North Carolina State College, the National Naval Medical Center at Bethesda, Maryland, at Texas A. & M. College, at the Universities of Virginia and of Florida, at Vanderbilt University, and at Babcock & Wilcox's plant at Lynchburg, Virginia.

Two nuclear power plants are under construction—a 17,000-kilowatt facility at Parr Shoals, South Carolina, for the Carolinas-Virginia Nuclear Power Associates under the AEC power demonstration program, scheduled for operation in 1962; and a 50,000-kilowatt plant for the East Central and Florida West Coast Nuclear Power Groups, also under the AEC power demonstration program, scheduled for operation in 1963.

The number of AEC radioisotope shipments showed a 12 percent increase in the region in 1957 as compared with a 10 percent rise for the nation as a whole.

Florida, and the South generally, is deeply interested in prospects of the use of nuclear energy in food preservation to allow perishable vegetable products which now must be refrigerated to be moved across the nation, to be marketed more economically. Radiation is being extensively used (particularly in conjunction with the radiation facility at the University of Tennessee) to treat seeds and growing plants for higher yields and disease resistance. Experiments in the desalting of sea water for use in various ways are well advanced.

Some 30 southern universities are now working in co-operative programs of training and research, sponsoring the Oak Ridge Institute of Nuclear Studies.

One interesting innovation by the Southern Regional Advisory Council on Nuclear Energy has been the setting up of a panel of editors of six major newspapers in the several states to help guide a comprehensive public information-public education program on atomic energy; and the Florida Nuclear Development Commission issues a four-page printed monthly newsletter which is very impressive.

Another unique feature developed by the Southern Regional Advisory Council is the traveling science teacher program—a teacher training program designed to stimulate teen-age interest in science. Teachers attend a summer course at Oak Ridge Institute for Nuclear Studies. Fol-

lowing the course, the teachers are relieved from their regular duties for one year to make one-week visits to selected high schools for special demonstration lectures.

Of the 15 states in this regional compact, five—Arkansas, Florida, Kentucky, South Carolina, and Tennessee—have adopted legislation following the New England model act, with variations. *Arkansas,* however—a minor state in atomic energy activities—has provided no funds to carry out the purposes of its act. The state civil defense director acts as co-ordinator, with one person from the state health department as staff.

South Carolina has neither appointed a co-ordinator nor appropriated funds to carry out the provisions of the act.

Tennessee

Tennessee has a paid part-time atomic energy advisor (a former AEC field information director) who also serves as executive secretary of an unsalaried advisory committee of citizens which is intended to be the co-ordinating body. Members of this committee are: a banker, the state budget director, a labor leader, an educator, a physiologist, a lawyer-industrialist, a reactor engineer, a biologist, and an agricultural college dean. The advisor, retained under consultant contract, provides his own secretarial and clerical service, and some such service is also provided by the department of the budget, which administers his contract. A budget of $25,000 per annum is appropriated to carry out the provisions of the act.

The advisory committee has strongly recommended that Tennessee officials take over inspections of premises of nonfederal users of radioactivity now being inspected by AEC, and has asked key state agencies to study the impact of atomic energy on department functions and to suggest needed changes in powers or regulations. The department of public health is now in process of developing a set of rules and regulations for radiation health and safety. It has six persons trained in atomic energy inspection.

Perhaps the chief energy of the committee has gone into a program of public education, including newspaper and radio-TV features on atomic subjects, educational exhibits at county fairs, circulation of lists of free atomic films to schools and TV stations, and a seminar for industry on industrial use of isotopes.

The location of Oak Ridge National Laboratory and other facilities in the state has meant the ready availability of personnel and other resources.

Florida

Florida has a half-time executive director (co-ordinator), who is also half-time administrative assistant to the governor, with a stipulated salary of $10,000. As co-ordinator, he has a full-time secretary, a half-time consultant from outside state government, and currently for a six-month period, a full-time staff director of the Nuclear Development Commission's Committee on Science and Mathematics. Twenty-five thousand dollars have been appropriated for each of two years to carry out the purposes of the act.

The executive director, instead of being governor-appointed, is appointed by the nine-member Florida Nuclear Development Commission. Appointed by the governor, these unsalaried members serve four-year terms, their duties being wholly advisory, co-ordinating, and educational. This commission has formally established relations with two other agencies—the Florida Development Commission, an agency which also has an annual budget of $25,000, established to stimulate nuclear industrial development in the state; and, in its educational activity in institutions of higher learning, with the State Board of Control (comparable to a board of regents).

The Florida Legislature in 1957 authorized the State Board of Control to develop and carry out programs of nuclear studies and research in the state university system, and appropriated $5,200,000 for this purpose. The University of Florida has a nuclear training and research reactor, the College of Agriculture an irridiation facility, and Florida State University two atomic accelerators.

The advisory commission's committee on science and mathematics has launched a program to improve the quality of science instruction, making fuller use of audio-visual materials and conferences for community leaders and educators.

Other commission activities have been: sponsoring national conferences on atomic energy in Florida; surveying nuclear industrial opportunities in the state; helping locate a power reactor in Florida; and exploring the possibility of developing there a principal facility for refueling nuclear submarines and reprocessing nuclear submarine fuel. It has sponsored a "newsman's seminar on nuclear energy"; surveyed public attitudes and reactions to the state nuclear program; had booths and exhibits at state fairs; and issues the monthly newsletter mentioned above.

Its regulatory activities have been less pronounced. It has formed a committee on radiological safety working with the board of health on health and safety regulations which may be needed, and with the industrial commission on industrial safety codes; and has helped draft regulations for intra-state transportation of radioactive materials. In October, 1958, it held a meeting on nuclear waste problems with the Florida Sewage and Industrial Wastes Association.

Kentucky

In 1957 the Governor of Kentucky, using emergency funds, appointed a nine-member advisory committee on nuclear energy, to co-ordinate the studies recommendations, and proposals of the state agencies regarding atomic energy; and appointed a co-ordinator who was also *ex officio* executive secretary of the advisory committee. Upon the recommendation of this committee, the 1958 legislative session passed a bill modeled after the New England Model Act, giving the advisory committee statutory status, and expanding it to 15 unsalaried members who represent medicine, industrial planning, public health, workmen's compensation, agriculture, fossil fuels, law, labor, education, and insurance. Proposed laws or regulations in this field must be submitted to the Advisory Committee on Nuclear Energy for review 30 days prior to filing with the Legislative Research Commission.

The committee is attached to the Department of Economic Development, within which has been established a nuclear information division, whose director is the co-ordinator serving as executive secretary to the advisory committee. Thus the advisory committee on nuclear energy is the principal advisory body in the state, while the nuclear information division of the department of economic development is the principal operational agency in the state, concerned with promotion, development, and putting into effect the recommendations of the committee.

Several committee activities are worthy of note. As in Ohio, its representatives met with officials from the AEC Oak Ridge Operations Office and developed a procedure whereby health and safety teams will be made available immediately on call from the co-ordinator in event of a major accident producing radiation hazards. Accidents of lesser scope are to be handled by teams on call from the department of health. The entire program is complemented by the civil defense organization plan which has placed 1500 pieces of detection equipment over the state so that some is available not more than 25 miles from any point within the borders. Highway patrolmen, firefighting teams, and health officials will work together in making a preliminary survey of any area suffering emergency conditions.

Not the least effective action taken as a top-echelon information effort was to have one of the nation's leading atomic energy administrators, manager of the Oak Ridge AEC operation, address a joint session of the legislature on February 20, 1958, on Kentucky's opportunities and responsibilities in the field of nuclear industry. Kentucky is the first state in the nation to have its legislature so addressed.

Nine subcommittees of the advisory committee on nuclear energy have been set up and are hard at work in the following fields:

Public Health: The * * * Department of Public Health has completed an evaluation of all available radiation codes from other states to make a comparative analysis between considered action in Kentucky and what is being done by other states. * * * under consideration is a regulation which would require the registration of all principal radiation sources. * * *

Industrial Relations and Workmen's Compensation: This subcommittee has been formed to draft a revision to State Workmen's Compensation laws which would assure adequate coverage of industrial injuries from toxic radiation. * * *

Insurance: This subcommittee is studying reports by the Atomic Industrial Forum, Nuclear Energy Property Insurance Association, Nuclear Energy Liability Insurance Association, Atomic Energy Commission, and other sources relating to insurance of persons and property from hazards to life and property resulting from nuclear energy development. It will recommend an official attitude and position for the state in this field as well as [necessary] laws and regulations. * * *

Laws and Regulations: This subcommittee has as its function the review and study of any proposed regional, Federal, or local documents, laws, or regulations relating to the nuclear energy field.

Education: This subcommittee has been formed to compile information about physical facilities of various colleges and universities in Kentucky which are applied to nuclear research and/or development, [and] faculty with background in nuclear energy or related fields. * * * Concurrent efforts are being made to improve secondary science training.

Industrial Planning: This subcommittee has been formed for long-range planning with consideration of unique features of Kentucky's natural resources, economy, geographic placement, etc., which might be conducive to development

of nuclear industry * * * and * * * enhance procurement of contracts by Kentucky industry. * * *

Public Utilities: This subcommittee is attempting to determine the most desirable role of Kentucky public utilities in projects looking to the development of production or utilization facilities for industrial or commercial use.

Agricultural Research and Development: This subcommittee is recommending the course of action for development of facilities and training in this field as it relates to the gainful application of controlled radiation.

Other subcommittee work includes a survey being made to determine the possible adaptation of abandoned mines in Kentucky as potential storage areas for radioactive wastes, as well as studies on transportation, planning and zoning, conservation, and tax structure.

Special projects include a plan for development of a coal gasification and liquefaction pilot plant in Kentucky using nuclear energy as a heat source.[58]

Other states in the southern compact are still in the study committee phase. In its 1958 special session the Virginia legislature considered a recommendation from its study committee apparently modeled on the American Public Health Association Act, but the bill did not pass.

At present, no southern state except Texas requires registration of radiation sources.

This completes the survey of nuclear activity and legislation in the 15 states of the southern compact.

To complete the legislative record: The State of Washington is the latest to adopt the New England-type act (in 1957). It established a governor-appointed advisory council on atomic energy consisting of five unsalaried persons who may, however, be reimbursed for necessary expenses to the extent of $15 per day plus travel expenses. The co-ordinator is a former specialist in fuel development operation at GE's plant at Hanford, Washington. He also serves as executive secretary to the advisory council. His salary is stipulated not to exceed $20,000. Washington's version of the act does not require that proposals on atomic energy matters from departments or agencies shall come before the council or co-ordinator for approval before becoming effective.

SUMMARY OF THE LEGISLATIVE AND REGULATORY ACTION TAKEN BY OTHER STATES

Registration of Sources

Sixteen states now require registration of radiation installations. They are: Alaska, Colorado, Connecticut, Delaware, Illinois, Kansas, Massachusetts, Michigan, Minnesota, New Jersey, New York, North Dakota, Pennsylvania, South Dakota, Texas, and Wyoming. In every case except Massachusetts (which requires industrial radiation installations to register with the department of labor and industry) such registration is with the state department of health; but in New York, registration is shared among the departments of health and of labor, and New York City's health department. Of the 10 states which are leaders in industrial radioisotope use, only Ohio, Missouri, and California are without a registration requirement; and Ohio has compiled an official list of radiation sources.

[58] Letter of November 13, 1958, to Dwight Waldo, Acting Director, Bureau of Public Administration, University of California, Berkeley, p. 2-3.

Comprehensive Radiation Codes

Twelve states, five in New England, five in the southern compact, and Ohio and Washington, have passed legislation modeled upon the New England act, but with variations. They are: Arkansas, Connecticut, Florida, Kentucky, Maine, Massachusetts, New Hampshire, Ohio, Rhode Island, South Carolina, Tennessee, and Washington.

Of these 12:

Three—Arkansas, Maine, and South Carolina—have *appropriated no funds* to carry out the purposes of the law.

Five—Connecticut, Massachusetss, New Hampshire, Tennessee, and Florida—have *part-time co-ordinators*, Florida's sharing his time as administrative assistant to the governor in the other half.

Two—Rhode Island and South Carolina—have *no co-ordinator*. In Rhode Island the chairman of the unpaid atomic energy commission serves. In two others—Arkansas and Maine—the title has been bestowed on an existing official, without compensation.

Two—Ohio and Washington—have *full-time paid co-ordinators;* and Kentucky's co-ordinator seems to be full-time in all but title. He gives full time to his job as director of the nuclear information division of the department of economic development.

Of the nine states which have appropriated funds for their act, all except Connecticut and New Hampshire have *advisory committees.* In all cases these committees serve without compensation but are granted either a set sum for days served on committee duty or are reimbursed for necessary expenses. The size of the committees varies: five in Rhode Island and Washington, six in Massachusetts, nine in Florida and Tennessee, 11 in Ohio, and 15 in Kentucky. All are citizen committees rather than committees of technical experts, although some states have representatives of both categories.

American Public Health Association Model Act

New Jersey is the only state to date which has enacted legislation patterned on the APHA model, which makes the health department the state's regulatory agency. It has set up a commission of technical experts advisory to the health department—five members, appointed by the governor with the consent of the senate and of the commissioners of health and labor.

* * * * *

The five states which currently lead in nuclear energy industry—New York, California, Pennsylvania, Texas, and Illinois—are all carrying on their regulatory and developmental work through existing departments. New York, California, and Illinois, however, are giving considerable study to possible legislation to achieve statewide co-ordination of nuclear energy activities.

It is perhaps noteworthy that the state which ranks tenth in use of radioisotopes, and which has two large uranium refining and conversion plants, (Missouri), is one of the seven states which have apparently enacted no legislation, rules, or regulations in response to the new problems brought to government by atomic energy industrial development. The others are Arizona, Montana, Nebraska, Nevada, Utah, and Vermont.

Appendixes E, F and G, pages 237-247, summarize data on the states which have an act patterned on the New England model.

CHAPTER VI

SURVEY OF THE PROBLEMS RAISED BY NUCLEAR INDUSTRY

The complex array of problems raised for government by the peaceful use of revolutionary technologies of the nuclear age fall into three broad classes: the need to protect health and safety, the need to protect affected economic interests, and the need to assure that education is designed and made available to all who must understand and meet the challenges of a changed world.

Health and safety needs, in turn, are different for those who work in nuclear industry (usually protected by state departments of labor and industry) and for the general public (usually protected by departments of public health.) As to economic questions involved, a new look is required at workmen's compensation law, at life and property insurance for atomic energy businesses, at public utility regulation policies, tax policies, and investment opportunities and regulation.

The educational adjustments required fall into the categories of the new types of technical and professional education and training for university nuclear training programs; health agencies; labor and industry departments; fire, police, civil defense, and highway patrol personnel; and for management and workers. General nontechnical education is needed as well, both for the general public, young and old, in schools, and through mass media; and for public officials and community leaders primarily responsible for the major decisions of government.

A number of these questions have been briefly touched on in the preceding chapters—particularly those related to health and safety—but now the attempt will be made to map the whole territory in an orderly fashion, while supplying some fresh data relevant to the problems not yet discussed in these pages.

PROTECTION OF HEALTH AND SAFETY [1]

We may summarize the data on the types of radiation and their physiological effects by these excerpts from the report of the U. N. Committee on the Effects of Atomic Radiation:

Basic Physical Concepts

> X-rays, neutrons, protons, cosmic rays and the radiations (alpha-, beta-, gamma- rays) emitted by radioactive materials * * * produce biological effects by means of the same physical process, namely energy transfer. * * *
>
> The biological effect of a given type of radiation depends upon the energy absorbed in the tissue. * * * Whatever the type of radiation, much of the energy transferred is dissipated in ionization. * * *

[1] Dr. Dell F. Dullum, Consultant in Radiologic Health, California Department of Public Health, was kind enough to read this chapter in an earlier version and to make several valuable suggestions.

The ratio between the energy absorbed and the total ionization produced is almost independent of the kind and energy of particles producing the ionization; therefore, ionization is used as a measure of radiation exposure. * * *

Alpha rays or particles are helium nuclei (particles) emitted by the nuclei of some radioisotopes in the process of radioactive disintegration.—Because of their relatively small velocity, and because they are charged (alpha rays) produce very dense ionization along with their paths, and their range or penetration in matter is consequently small. Practically none is known with a range greater than 0.1 mm in tissue. * * *

Beta rays or particles are high speed electrons emitted by the nuclei of certain radioactive isotopes.—Being charged particles (beta rays) produce ionization directly in matter through which they pass. They have a much greater range than alpha rays and, because of their much greater speed, they produce much less dense ionization. Few isotopes emit beta particles of maximum range greater than 2.0 cm and none of range greater than 8 cm in tissue.

Gamma rays are electromagnetic radiations emitted by the nuclei of some radioactive isotopes.—Gamma rays * * * have energies which are characteristic of the radioisotopes by which they are emitted. Since they are not charged particles they ionize matter indirectly through ejection of high speed electrons from the material in which they are absorbed. * * * These electrons may be ejected at a considerable depth in tissue; each electron then dissipates its energy within a short distance (from less than a millimeter to a few centimeters depending on its energy) of its point of origin. No definite range can be given for gamma rays since they penetrate any thickness of matter but with progressively decreasing intensity. * * *

X-rays.—X-rays are also electromagnetic radiations and, therefore, interact with matter and produce biological effects in the same manner as gamma rays. * * * The energy of X-rays and, therefore, their penetrating power is determined by the voltage applied to the tube. The X-rays used for diagnostic medical procedures are less energetic and less penetrating than most gamma rays but it is possible to generate X-rays which are more penetrating than gamma rays from any radioactive nuclei.

Neutrons.—Neutrons are normal constituents of atomic nuclei, from which they are ejected during processes such as fission. Because they are uncharged, they cannot produce ionization directly.

Fast neutrons lose energy mainly by collision with the nuclei of light atoms, especially those of hydrogen (protons). These nuclei recoil and being charged, produce ions as they dissipate the energy transferred from the neutron. * * * The recoil nuclei * * * give rise to a more dense ionization than beta rays or electrons ejected during the absorption of X-rays and gamma rays. The transmission of energy from fast neutrons to recoil nuclei can take place at a considerable depth in tissue; like X-rays and gamma rays, fast neutrons have no definite range.

Slow neutrons have no definite range either. They interact with matter mainly by nuclear reactions which result in an immediate emission of charged particles of gamma rays during the creation of isotopes, some of which are radioactive. The surrounding medium is ionized by these particles or gamma rays as well as by the delayed radiation emitted during the subsequent disintegration of the induced radioisotopes.

Cosmic Rays.—Cosmic rays are an extremely penetrating group of radiations that originate from heavy particles coming from extra-terrestrial sources. The primary component is absorbed in the high atmosphere, giving rise to various types of radiation, each producing ionization in its own characteristic manner.[1]

Some of the principal charcteristics of the above radiations are summarized in Table XIII on page 133.

Basic Biological Concepts

A living cell is a highly complex entity, all parts of which are involved in its normal functioning. Radiation may induce alterations at random in any part of this complex mechanism, and this may have harmful consequences ranging from inhibition of cell division to impaired function or cell death. *Cells* of a particular type are arranged as *tissues,* many of which form different *organs.* Some tissues are more sensitive to radiation than others; among these are tissues of the gonads, the skin, the intestines, the eye, and the blood-forming tissues present in the bone marrow, spleen, lymph nodes and elsewhere in the body.

* * * * *

* * * It is important to consider separately radiation injury to two categories of cells, namely, those concerned with the maintenance and integrity of the individual (such as cells in bone marrow, blood, liver or nervous system) and those concerned with the maintenance and integrity of the genetic information that is handed on from generation to generation (reproductive cells of gonads). Correspondingly, we shall speak of *somatic effects* (limited to the irradiated organism itself), and of *genetic effects* (limited to its descendants).

* * * Among the physical factors (which influence the biological effects of exposure to ionizing radiation) are the type of radiation —such as X-rays, alpha, beta or gamma radiation; its energy; the size of dose; its distribution in time—whether given during a short or a long period, or repeatedly; its spatial distribution—involving the whole or only part of the body; and the origin of the radiation —from outside or from within the body. Biological factors which affect the sensitivity of a tissue to radiation include its degree of oxygenation and water content, its blood supply and metabolic state and various constitutional states of the body as a whole.

* * * radiation reaching the body from sources outside it and that which comes from radioactive materials incorporated within the body act in basically the same way, but internal radiation exposure is often distributed more irregularly, since radioactive

[1] United Nations. *Report of the United Nations Scientific Committee on the Effects of Atomic Radiation.* (1958) pp. 3, 4.

Table XIII

PRINCIPAL CHARACTERISTICS OF VARIOUS RADIATIONS *

Radiation	*Nature of radiation*	*Principal source*	*Typical energy*	*Penetration*
Alpha	High speed helium nuclei	Radioactive nuclei	A few Mev [a]	Very easily absorbed
Beta	High speed electrons	Radioactive nuclei	A few Kev [a] to several Mev	Easily absorbed
Gamma	Electromagnetic radiation (photons)	Radioactive nuclei	A few Kev to several Mev	Relatively penetrating
X-rays	Identical with gamma	X-ray tube	A few Kev to several Mev	As for gamma rays
Neutrons	Uncharged particles	Nuclear fission and transmutation	Up to several Mev [b]	In general very penetrating
Cosmic	Mixture	Extra-terrestrial	May exceed many thousand Mev	Very penetrating

a. The energy of ionizing radiation is usually measured in electron-volt (ev) or in the multiple units of one thousand electron-volt (Kev) or one million electron-volt (Mev). One electron-volt is the energy equal to that gained by an electron when it is accelerated through a potential difference of one volt and is equal to 1.6×10^{-12} erg.

b. "Thermal neutrons" have very low energies, corresponding to a velocity which is the same as that of the molecules in air of normal temperature.

* United Nations. "Report of the United Nations Scientific Committee on the Effects of Atomic Radiation" (1958), p. 4.

materials may be concentrated mainly in certain tissues or organs, and since radiation may only penetrate for a short distance from the sites of concentration in the body.

When *radioactive elements* are taken up by the body, they may accumulate particularly in one tissue or organ which then becomes the most severely injured by irradiation. A *critical organ* is defined as that organ the injury of which causes the greatest damage to the body. The critical organ is usually the one which accumulates the greatest concentration of the radioactive material, but this is not always the case, since some organs are more sensitive to radiation, and some are more essential to the well-being of the body than others.

Somatic Effects. If a single large dose of over 600 rem of penetrating radiation is delivered to the whole human body or to a large part of it in a matter of minutes, it will cause death in a matter of days or weeks. * * * If, however, such a dose is delivered to a limited part of the body, as for instance to the hand, generally only a local reaction such as skin erythema will be evident. * * * if a dose of whole body irradiation, which would rapidly have caused death if given as a single dose, is divided into small fractions which are delivered over a period of months or years, with exposure-free intervals between them, immediate death does not occur but a pattern of chronic injury may result. * * * chronic exposure, despite apparent recovery, may have permanent pathological effects, and the ensuing illnesses may develop after long latent periods. Chronic irradiation may cause severe damage to the blood-forming tissues causing leukemia. * * * It may also cause * * * a diminished resistance to infection, shortening of life-span and malignant tumours. * * * If some characteristic effect appears after an exposure-free interval or latent period of several months or years, it is termed a delayed effect (and leukemia or cancer may develop in this way). Among the survivors of atomic bomb explosions in Hiroshima and Nagasaki, the development of leukemia has been significantly more frequent during the years since the explosions than among a non-exposed population.

Genetic Effects. Genes are the entities which determine heritable characters. The genes are located * * * in a certain definite sequence in threadlike structures, the *chromosomes* within the cell nucleus. * * *

Both genes and chromosomes are particularly vulnerable to the effects of radiation. Therefore, exposure to radiation is expected to increase the number of random and rare heritable changes beyond that which naturally takes place in cells. These changes are known as *mutations;* they usually give rise to unfavorable genes which play a part in causing defects and diseases in man. Only the frequency of the mutational changes is altered by changed radiation exposure: the severity of the effects of any individual change is unaffected by dose.

The characters that can be utilized (in estimating radiation-induced mutation rates in man) may be grouped in two categories, according to whether they are connected with dominant * * * visible mutations or with dominant * * * lethal mutations. The

detection of visible dominants is carried out in practice by the observation of malformations at birth. It is in fact reasonable to assume that an increase in the frequency of dominant mutations associated with visible effects would manifest itself to some unknown extent as an increase in frequency of malformation. * * *

Lethal mutations may be revealed in four ways:

(a) Increase in frequency of miscarriages (virtually impossible to determine with certainty);

(b) Increase in frequency of still-births (much more feasible but subject to the demographic considerations mentioned in connexion with neo-natal mortality);[2]

(c) Reduction in fertility, or even sterility (virtually impossible to measure in man);

(d) Disturbance in the ratio of the sexes at birth (deviation in the sex-ratio, an easily observable criterion).[3]

Protection from external radiation may be achieved in the following ways. External exposure to alpha particles is likely to produce only skin burns, not usually serious unless the doses are very high; a few inches of air can serve as a shield against alpha radiation. A sheet of aluminum one-sixteenth of an inch thick will stop most beta particles; several feet of dense materials like concrete or lead may be required to shield persons working near X- or gamma-rays; while several feet of paraffin or water (both containing hydrogen) are often used as shielding from neutron sources.

In general, protection from ionizing radiations is accomplished through manipulation of three factors: shielding, distance from source, and exposure time. The greater the distance from the radiation source, of course, the smaller the dose received—doubling the distance decreases the intensity fourfold.

Besides avoiding high external radiation it is important not to let alpha or beta particles enter the body—for example, through eating food contaminated with them, breathing contaminated dust or air, or admitting them into the blood stream through cuts or scratches in the skin. Radioisotopes within the body irradiate the tissues continuously until they are eliminated—or, in the case of short-lived ones, have lost their energy—and continuous cell-irradiation by substances of even very low energy can, over the years, produce extensive cell-changes. Because they are so hard to control once they have been admitted to the body, and because they may result in exposures over such long periods of time, radioisotopes taken into the body are apt to be much more damaging than those assaulting the body from outside.

Some of the implications for government of the facts presented above will be developed below.

Health and Safety of Workers in Nuclear Industry

The United Nations Scientific Committee Report says of occupational exposure:

> At present, the exposure to ionizing radiation received occupationally forms only a small contribution to the total irradiation of the population as a whole, amounting to about 2 percent of that

[2] E.g., age of parents, order of birth, and so on.
[3] *Op. cit.* pp. 5, 6, 180.

from natural sources in countries in which ocupational exposure is probably largest. With an increasing use of nuclear reactors, of radioactive materials and probably of medical and industrial radiological procedures, this is clearly a figure which should be kept under close review. Although this source does not appear likely to make a substantial contribution to the total radiation exposure of populations in the immediate future, the occupational exposure of some individuals may represent a large fraction of their total radiation exposure. [4]

Workers in weapons-producing installations, those operating reactors, or working with materials which have been around reactors—including radioactive wastes and fuels removed for reprocessing—are in occupations with the greatest potential radiation hazard; but personnel working with particle accelerators, or doing industrial radiography with X-ray machines or gamma sources may also be in considerable danger of accidental irradiation.

Writing on "Administrative Problems in Radiation Protection," two members of the New York State Labor Department point out that the current expansion of radiation usage makes self-regulatory measures inadequate. Radiation protection is expensive, and unfair competitive advantage may be obtained commercially while jeopardizing the health and safety of employees and the public. These writers estimate the chief types of radiation sources as follows:

Nuclear Reactors. Each type has its own problems of shielding, waste disposal, and possible air or water pollution.

Machines, e.g., Accelerators. Shielding regulations would have to recognize the wide variations in power and shielding material absorption characteristics, as well as possible changes in permissible levels.

Encapsulated Radioactive Material. This material presents an inhalation and ingestion hazard in case of rupture of the capsule. Specific control would require adequate ventilation and frequent checking to certify the integrity of the encapsulation.

Loose, Bulk Radioactive Material. This, through danger of external exposure, ingestion or inhalation, represents the highest hazard of all source types. [5]

A recent AEC report indicates the types of hazard to which workers in the atomic energy program are potentially exposed.

Every year one or more new radioactive or toxic materials emerges in the atomic energy program as extremely important from a health standpoint, either because the material has not previously been handled in sizable quantities, or because it is encountered in an unfamiliar form or in new circumstances.

Against penetrating radiations from a reactor, an X-ray machine or a high-energy particle accelerator, protection can be accomplished with relative simplicity once the type of radiation emitted,

[4] *Op. cit.*, p. 37.
[5] Tabershaw and Harris, "Administrative Problems in Radiation Protection," *Nucleonics* 12: 8 ff., December, 1954.

its energy, rate of emission, and its relative biological effectiveness are known. Shielding, the carefully planned use of distance, time limits on exposure, or these methods in combination, are sufficient.

When radioactive materials are moved around, mined, processed, or machined, as reactor coolants pass them into a river, or as stack gases from processing plants disperse them to the atmosphere, they may be absorbed into living systems. Under such circumstances the problems of protection multiply and precise knowledge is necessary to guard against the toxicity of each form or compound of a given radioisotope if it should accidentally enter the body. The material may be soluble or insoluble, particulate, liquid or gaseous, bound or unbound to specific organic or inorganic matter. If it is in particulate form, the size of the particle is very important in determining its retention if inhaled. If it is in a liquid state it must be known whether it can be absorbed directly through the skin.

Finally, the commission must be prepared to cope with accidents if the material comes in contact with and enters the body through a cut or abrasion, through the lungs by inhalation, or through the gastrointestinal tract by ingestion. It is then necessary to know where it will be in the body, in what organs it concentrates, and how long it will stay there. Means must be devised for determining how much is in the body at a given time (bioassay methods) and coincidentally methods must be developed for speeding up the removal of a radioelement from the body (p. 216).

* * * * *

Problems arise also from the processing of materials which have been passed through reactors; from radioactive industrial wastes; and from the testing of atomic weapons. Many of these same problems arise with the development of nuclear power by private, city, state, and co-operative organizations, or with industry's efforts to advance other peaceful uses of atomic energy [6] (p. 110). * * *

The safety record of AEC-contractor operations has been excellent; but government contracts include the costs of the devices and procedures needed to insure that safety. It would be less than realistic to assume that atomic energy installations in private hands will automatically and universally adhere to as high safety standards as when the cost of such adherence was not a consideration. Under the spur of economic drives a number of private industries may feel it is too expensive to put in adequate radiation control. No state wants to retard or impede atomic energy industry. But the responsibility of state regulating agencies will be grave, not merely to the workers involved but to their children and future generations.

There is a widespread impression that most of the workers in nuclear energy installations are employed by AEC and so not within the jurisdiction of state industrial safety and workmen's compensation laws. This is not the case. The AEC employs around 6,000 persons directly, most of them professional and clerical workers not exposed to radiation hazards. AEC-contractor employees, on the other hand, number usually around 111,000 (113,335 in April, 1957; 110,359 in December, 1957),

[6] U. S. Atomic Energy Commission, "Twenty-first Semiannual Report" (January 1957), p. 216, p. 110.

and these, with very few exceptions, are actually or potentially exposed to the hazards of radiation and within the scope of the safety and compensation laws of the states in which they are working. California employment in radiation-exposed industry is not definitely known. But with AEC contracts in the state employing 8,500 (see Chapter III, p. 59), with California using about one tenth of the national total of radioisotopes, and possessing more reactors than any other state, a figure of 11,000-15,000 does not seem unlikely. Their number, geographical location, and the nature of the hazards to which they are exposed should be ascertained as soon as practicable.

These workers are protected by the codes embodied in the AEC regulations and the safety orders of the State Division of Industrial Safety. The possible need for a larger inspection staff has already been noted —a need which is certain to increase as nuclear energy use, and the use of non-AEC-regulated radioactive materials, increases. In addition, the codes themselves become outdated.

Code Revisions.[7] Unless the codes setting forth maximum permissible dosages and exposures are themselves in keeping with the most up-to-date medical advice, even a very good inspection and control program will not meet the need. The National Bureau of Standards Handbooks, on which California and most states rely, are in process of revision, and the Safety Orders of the Division of Industrial Safety and the standards employed by the Department of Public Health based on these handbooks will need prompt revision when the new standards are published, as these agencies are well aware. Several committees of the American Standards Association, too, in particular the subcommittees on reactor safety standards and on radiation protection, are now at work and will have something of value to offer state regulatory agencies within a year or two.

The Joint Committee on Atomic Energy is holding hearings this year on radiation hazards as they affect workers and the general public. Congressman Chet Holifield, chairman of the subcommittee of the JCAE which will conduct the hearings, assured the California Interim Committee on Public Health, Subcommittee on Air Pollution and Radiation Protection, at its November, 1958, hearings in Los Angeles, that a man-

[7] California statewide codes and statutory provisions protecting health and safety of workers and public against the dangers of atomic radiation are as follows:

Group 56, Article 53, of the General Industry Safety Orders, State of California Department of Industrial Relations, sets up "minimum standards for the protection of employees exposed to potentially injurious levels of ionizing radiations or potentially injurious quantities of radioactive materials" and applies to all employments and places of employment in California as defined by Labor Code Sections 6302 and 6303. Article 53 contains 13 sections including rules regarding supervision and instruction, maximum permissible exposures, handling and storage of radioactive materials and instruction of employees. The code was adopted in January, 1955.

Sections 6311 of the State Labor Code, which defines "Safety Devices and Safeguards," was amended by Chapter 528, Laws of 1957, to add "the danger of exposure to potentially injurious levels of ionizing radiation or potentially injurious quantities of radioactive materials" as a specific danger the device is intended to mitigate or prevent. The amendment became effective August 20, 1957.

Chapter 7, "Radioactive Wastes," was added to the State Health and Safety Code in 1955 and permits the State Department of Public Health to prohibit dangerous disposal of radioactive wastes. Chapter 7 was added under Chapter 1868, Statutes of 1955.

House Resolution No. 58-X, adopted by the State Assembly on April 16, 1958, states that ocean disposal of radioactive wastes should be performed only in places "mutually arrived at by the State of California and the Federal Government" and petition the Federal Government to dispose of such wastes under AEC or National Committee on Radiation Protection recommendations.

ual to guide state legislatures and regulating agencies in designing their own codes and standards will be the product of the joint committee's work. California, which has been in the vanguard in worker protective legislation, will doubtless brook little delay in making state standards conform to such federal recommendations.

The Division of Industrial Safety of the California Department of Industrial Relations, operating under the Labor Code, has the responsibility and the authority to see that every employment and place of employment is safe for the worker. On the basis of court decisions, it has been established that the division's powers may extend to protection of the public as well.

The division prepares Safety Orders (standards of industrial safety) which, if approved by the Industrial Safety Board (four governor-appointed members, with overlapping four-year terms, plus the Director of the Department of Industrial Relations, who is chairman) have the force and effect of law.

The division has spelled out its philosophy as follows: "Engineering, enforcement and education are all 'education' in the broad sense."[8]

The division recognizes that it is time to change or revise Group 6 of the General Industry Safety Orders, which cover radiation and radioactivity. Its chief, Mr. A. C. Blackman, who is a member of AEC's Advisory Committee of State Officials, has been studying revisions of the various handbooks and will soon propose initiating work on revision of California's Code. This will take about a year of committee meetings prior to holdings of public hearing, so 1960 may be estimated as the earliest date for the hearings. Meanwhile there is great leeway provided in the present code for special orders, or rules and regulations to be established, either upon complaint or on the division's own volition, to cover a specific individual place of employment or a process of work.

A spokesman for the division estimated that there are from 6 to 7 million employees in California. The division has 85 engineers (inspectors) for over 300,000 places of employment, about one man to 25,000 employers. They are supposed to perform routine checks on the safety of places of employment. Some of them, however, have such big territories that they must travel great distances between inspections. They work under a system of priorities—first attending to complaints, then to establishments which their case-finding methods indicate may be particularly hazardous, then to routine visits. Supervisors receive daily reports of visits made.

There is one area of radiation hazard in which, even in terms of present standards, inspection and control have left much to be desired —that of workers operating X-ray and other high-energy machines. There is a relatively high incidence of radiation disease among these workers as indicated by a limited survey carried out by the Japanese National Research Institute for Radiation in 1954 and reported to the 1955 Geneva Conference:

> We examined 65 doctors, 75 X-ray technicians, 42 other workers at medical installations, 32 industrial workers operating X-ray machines or working with radioisotopes. Among them were found 9 doctors, 22 X-ray technicians, 9 medical workers, and 4 indus-

[8] Conversation with Industrial Hygiene Engineer for the division.

trial workers who required medical treatment or rest. The proportion of affected persons was almost 20 percent of the total number examined, which was a surprisingly high proportion. However, as the criteria used were very strict, it is hoped that the real level of radiation sickness is a little lower than these statistics indicate. But it must be presumed, at present, that there may be a considerable number of unreported, or not yet discovered, cases of radiation disease.[9]

Radiation Protection of Russian Nuclear Energy Workers Cited. In testimony before the Joint Committee on Atomic Energy in March, 1958, Andrew Biemiller, AFL-CIO legislative director, referred to the "slightly more restrictive maximum radiation exposure limit, * * * shorter hours, * * * and longer paid vacations * * *" provided workers in Russian atomic energy activities.[10] The source of his information was another report presented at the Geneva Conference by a Russian representative of the Ministry of Health:

> * * * the recommendation of the International Radiological Congress held in London in 1950 * * * as well as recommendations of various scientific organizations and committees in some countries (the U.S.A., Britain, and others) accepts a dose of 0.3 roentgen a week (or a physical equivalent of a roentgen) as an equivalent standard. We believe it is preferable to accept the daily dose of 0.05 roentgen in a working day as the basic standard. Here we proceed from the general concept drawn from the findings of many investigations carried out in the USSR and abroad that finely fractioned doses of irradiation lead to better restoration and, consequently, are of less danger than concentrated doses. In line with this thesis accepted in the USSR, all preventive measures (protection, the fixing of a permissible working day for certain conditions, etc.) are designed so as not to exceed the daily dose of 0.05 roentgen. A summary weekly dose of 0.3 roentgen is used only as an exception, in rare cases, when the conditions or nature of the work do not permit the observance of the fixed daily dose.
>
> * * * * *
>
> * * * legislation provides for special privileges, such as a longer paid holiday and a shorter working day for kinds of work involving exposure to ionizing radiation of higher intensity, though still below the maximum permissible dose.
>
> In assessing 0.05 roentgen or physical equivalent of roentgen as the maximum permissible dose of irradiation both for the USSR and as internationally recommended, one should bear in mind that this dose still exceeds the natural radiation background more than a hundredfold; this follows from the assumption that the most likely daily dose of the background amounts to 0.0004 of the physical equivalent of a roentgen.
>
> Hence, from the viewpoint of maximum concern for the health of people subjected to the action of ionizing radiations, it is advis-

[9] United Nations, *Proceedings of the International Conference on the Peaceful Uses of Atomic Energy*, v. 13, p. 5.

[10] U. S. Congress. Joint Committee on Atomic Energy, *Development, Growth, and State of the Atomic Energy Industry;* hearings . . . pursuant to Section 202 of the Atomic Energy Act of 1954, February 19-March 4, 1958 (85:2, 1958), p. 303.

able to resort to a reduced working day and longer annual paid vacations, along with technical measures aimed at the further reduction of the dose of radiation at the place of work. The object of these measures is to improve and to ensure a more complete process of recovery, which is of signal importance for the preservation of health.

* * * * *

A six-hour working day has been fixed for every kind of work at nuclear reactors, at cyclotrons, betatrons and other accelerating units; for work connected with the preparation and operation of neutron sources; for work on the gamma defectoscopy of metals and various articles (at both portable and stationary units); for operations dealing with the use of artificial radioactive isotopes in an open form, possessing either a considerable half-life or unfavorable conditions of distribution in the body, when present in quantities over 1 millicurie per working place (when using other isotopes— in quantities over 10 millicuries); in the case of industrial use of radioactive luminous substances of constant action; and when preparing radon baths, etc. The working day is reduced to 5 hours under specific conditions of treating patients with gamma therapy at medical establishments. It is worth mentioning that a shorter working day does not involve a reduced salary.

A longer paid vacation of 24 days is granted to everyone engaged in work dealing with radioactive isotopes in quantities over 1 millicurie at the working place, servicing stationary units for gamma defectoscopy, or engaged in the preparation of radon baths. A 30-day paid vacation is granted to those working at nuclear reactors, preparing neutron sources, operating accelerating units, cyclotrons, betatrons, etc.; working at portable units for gamma defectoscopy or at places where luminous substances of constant action are used; and to medical staff treating patients with gamma therapy, and others.

It is expedient to grant facilities, such as a shorter working day or a longer annual vacation, in cases when the average total dose of radiation for some reason or other exceeds approximately tenfold the natural background of ionizing radiations, despite the application of modern protective techniques.

* * * * *

Systematic compulsory examinations carried out by medical establishments every 6 or 12 months form a major part of the system of public health service. The timing of these examinations, depending on the amount of the radioactive substances used and the nature of work, is approved by the Ministry of Health and is obligatory for all those concerned.

The aim of periodical medical examinations is to detect in time the beginning of occupational diseases, and the development of other diseases incompatible with work in conditions of ionizing radiations.

* * * * *

The following specialized physicians take part in the medical examinations: a therapist, a neuropathologist, a gynecologist; when necessary, a dermatologist or ophthalmologist is consulted.

Persons inhaling radioactive gas (radon) undergo roentgenography of the lungs not less than once a year besides general clinical examinations.

Particular attention is paid to neurological examinations, since, according to many Soviet investigators, the nervous system responds particularly early to the action of ionizing radiation.

After every medical examination the physician of the establishment responsible for making inspections jointly with the members of the medical commissions, formulates his opinion on the condition of the person under examination, specifying the necessary medical and prophylactic measures. Their findings are entered into a special individual ledger kept in the institution, or are sent to the respective medical establishment if the worker in question has changed his place of work or residence. This system of regular medical inspections over a number of years makes it possible to accumulate comprehensive data on the possible effect of minute doses of ionizing radiations, which individual experiments fail to yield.

* * * * *

Persons working under conditions of ionizing radiation are recommended to spend their annual vacation * * * at sanatoriums and rest homes. Experience has shown that a visit to a sanatorium or a rest home is very effective in eliminating the changes which with some probability might be ascribed to the action of ionizing radiations.

Sanatorium and rest home accommodations are provided at a moderate price (30 percent is paid by the worker, and 70 percent from the social insurance fund).[11]

General AFL-CIO Position on Worker Health and Safety Measures. A. Radiological Health Monitor in the Plant. As the number of establishments increases in which workers are exposed to the hazards or potential hazards of atomic radiation, a new type of worker, the radiological health monitor, or, in the case of more highly prepared persons, the health physicist, has come to be an important plant adjunct.

Both labor and management have a stake in the adequacy of the work done by this new health agent. As General Electric Company's radiation protection consultant puts it:

> It is * * * the responsibility of industry to evaluate the use of radiation, in terms of the hazard, not only to employees but to the customers and the general public as well.
>
> Industry must also provide sufficient monitoring and inspection of its facilities and products to promote conformance to accepted standards, and it must maintain good records on personnel exposure, disposition of radioactive material, accidents, and unusual incidents.
>
> Finally, industry must arrange to have specialized medical assistance available for accident and emergency situations, and must keep all interested parties informed both of potential hazards and exposures incurred.

[11] United Nations, *op. cit.*, p. 159, 160-161, 166-167.

In order to carry out these responsibilities, industry has as a rule found it necessary to rely on the advice of a competent radiation-protection specialist, now usually called a health physicist—either a full-time employee or a part-time consultant. As a very general guide, one health physicist per 40 radiation workers should be adequate for an organization already operating a well-run safety program.

The competence of the health physicist is of crucial importance. A new international organization, the Health Physics Society, is currently drawing up a procedure to certify competent people in the field. This procedure should be in effect early in 1959. [12]

Management took most of the initiative while AEC contracts covering work in atomic energy included the costs of adequate monitoring and health inspection, but it may be expected that labor will increasingly seek to have a voice in the guarantee of such service and will make it a matter of collective bargaining.

The International Brotherhood of Electrical Workers has under its jurisdiction an autonomous craft union organized in 1953, the union of radiation monitors. Excerpts from an address by its business agent, explaining the work of the group to the IBEW parent body meeting in convention in 1958, explain the responsibilities and the training program of this group.[13]

In 1943, at the beginning of plutonium production at atomic energy installations, it was necessary to establish a control group in the operation of both reactor and separations facilities. This group * * * was known as the health instrument group. Its responsibilities were to control radiation exposures and contamination spread. This being the first attempt of man to control nuclear reaction on a production basis * * * experience * * * just wasn't there. The only background or experience that was available at that time came from the experimental attempts of the scientists, physicists, medical profession and others. * * * Extreme care and every precaution had to be taken to protect * * * workers, * * * water tables, * * * rivers, * * * plant life and the public in the surrounding areas.

For this, the health instrument group was established, under the Atomic Energy Commission.

As these facilities progressed, more experience and operating facts were established, and the radiation control men in the field became known as health instrument inspectors.

As the market called for faster, cheaper production, the "hazards" were increased, and the health instrument department grew to be a very necessary part of any facility handling radioactive isotopes.

* * * * *

In 1953, we succeeded in obtaining a majority vote of our unit and organized by our own choosing, under the protection of Local 112 of Pasco, Washington, of the I. B. E. W. retaining our own

[12] William A. McAdams, "Safety Problems in Ionization Radiation," *Industrial Bulletin* (New York State Department of Labor) 37: 17, December 1958.

[13] From the files of the International Brotherhood of Electrical Workers, San Francisco.

autonomy. We chose the I. B. E. W. after brief deliberation, because our instruments are basically electronic devices, designed to detect radiations and contaminants. We felt that the I. B. E. W. was the only organization that could honestly, and justly, claim jurisdiction of our craft.

Our title [was changed] from health instrument inspectors to (1) radiation monitor and (2) radiation journeyman, with a trainee program of 6 to 15 months training period for our new help.

We were at that time, and are at the present, the only organizaized group that works in radiation and contamination control, although at present there are many other groups * * * who work at our business. * * * I shall outline some of our responsibilities that protect you and all other craft who work in radioactive zones, and the general public including your immediate families.

The operational and maintenance control branch is the protection group you are most interested in. * * * They check the badges and pencils you wear to determine the actual amount of radiation you have received. They make surveys in the areas where you work so they may recommend proper restrictions, set proper time limits, and designate proper protective clothing and respiratory devices, according to the conditions. They check the time sheet, on which you record your time spent in dangerous areas, so they will know how much radiation you have been subjected to, and where. * * * They check the fixed monitor charts at all hazardous locations so they can protect you against changing conditions. They take samples of water, dirt, and other materials surrounding your work locations to see if contamination is present. They make personal surveys of your skin and clothing at intervals, to assure that you are not contaminated. They * * * check the air you breathe to make certain it has not become contaminated. The radiation monitor must be efficient in all phases of radiation and contamination control; the prerequisites for the performance of layouts and the process flow of the facility; the radiation characteristics of the various contaminants; and the ability to use the portable and semiportable instruments designed to detect these radiations and contaminants, and to interpret the results.

Although most of the monitors' work is according to procedures, or as directed, the work is of such complexity that [not every] detail can * * * be anticipated in the preparation of written or verbal instructions.

Therefore, there is often considerable leeway for the radiation monitor to exercise his own good judgment and salesmanship in the performance of his duties.

The radiation monitor must have a comprehensive knowledge of * * * radiation protection standards and be able to recognize violations of these standards * * * [He] must recommend the stoppage of any job that is not being done in a safe manner, or where the continuance of a job may cause loss of control of the radiation or contamination present.

* * * * *

* * * In the event of evacuation, due to radiation hazards or other causes, and in the absence of supervision or journeymen, he must assume full radiation monitoring responsibility, rendering assistance and advice pertaining to radiation to those in charge.

* * * * *

The journeyman must do all these jobs, and have expert knowledge and experience of radiation monitoring techniques.

The radiation monitor does not merely measure the radiation level in a given area and then specify the time limit for work in that area * * * his responsibilities extend much further. * * * A good monitor has a clear understanding of the operations, and appreciates the problems involved. He aids in solving the radiation and decontamination problems as they develop, and he knows where to look for and when to expect radiation hazards. He knows where and when to take air samples. He must determine if the radiation is uniform or localized in beams, and what geometry corrections to make according to beam size.

* * * * *

The mature monitor measures, analyzes, advises, and controls exposures to radiation hazards.

* * * * *

According to our experience, the ratio of radiation monitors to electricians in atomic plants is approximately equal: 10 of each to each 100 plant personnel.[14]

* * * * *

* * * a radiation protection clause demanding skilled monitoring protection should be written in every workable contract or agreement negotiated between labor and management of every craft subjected to radiation hazards. This is how we can help and protect our people.

Although the Radiation Monitors of the IBEW appear to be the only organized craft union in this field, other unions may require adequate health monitoring as part of the union contract. For example, in the International Union of Electrical, Radio, and Machine Workers, the shop stewards (who are the union members in charge of enforcing the contract in the shop) are given instruction in radiation hazards and made responsible for several specific duties in this regard. The *IUE Leadership Manual for Shop Stewards* instructs the steward as follows:

What is the shop steward's responsibility?

The shop steward must get the facts on radiation:

1. Find out whether or not any radioactive isotopes are in your department or in the plant.
2. If so—find out what kind of radioactive isotope.

   There are 400 different kinds. Each isotope is different in the amount of radioactivity given off and the intensity of the radiation.
3. Find out the special problems involved in the particular kind of isotope installed in your plant.

[14] The disparity between management and labor estimates here is noteworthy. Cf. the statement of the GE consultant on page 143.

Ask:

(a) Are there dangers of exposure from the existence of the isotope in your plant?

(b) Is the radiation exposure internal or external?

External radiation goes through the body like X-rays. Internal radiation is received by swallowing or by breathing radioactive materials.

(c) What standards of safety are required for use of this particular isotope?

1. What is the length of exposure permissible for this particular isotope?

   What are the time limits established for "hot" (radioactive) areas?

2. What kind of protective devices are necessary?

   What kind are being used? What distance limits are established for "hot" areas? What types of shields are provided? What provisions are made for washing up after radioactive exposure? Are work clothes provided and washed by the plant? What inspection procedures are in operation for testing to see that no one leaves the plant carrying radioactive material?

3. What kind of measuring devices are used to check the amount of exposure of each individual?

   In many plants the radiation you receive is measured by film badges or dosimeters which must be worn at all times.

4. What special medical facilities are available to check the possibility of overexposure or to take care of accidents involving radiation?

   Is a medical examination provided at regular intervals for those exposed to radiation? Is a blood test or medical checkup necessary before a worker can be safely exposed? Is there a specially trained health officer who is an expert in dealing with radiation hazards?

5. What records are kept for each employee on the amount of radiation to which he has been exposed?

   The rules of the Atomic Energy Commission, which hold for all plants under contract to the AEC, provide that careful permanent records must be kept of the amount to which each worker has been exposed. Every individual is entitled to receive a copy of his exposure record for the asking.

   But those companies not under contract to the AEC and using radioactive isotopes are not obliged to follow this practice although the National Academy of Science has recommended that all plants keep records.

   In such plants, until some nationwide ruling has been made requiring the keeping of records, this matter is a subject for collective bargaining.

Sources of radioactivity

The following isotopes are known to be strong sources of radioactivity.

When they are being used, someone in the local should receive special training on the hazards involved.

Cobalt 60; iridium 192; cesium 137; strontium 90.

Types of grievances

One source of grievance will be violation by the company, or the company's refusal to establish, any precautionary safety measures which you *know* (by getting the facts and consultation with experts) to be necessary.

Another source of grievance is likely to arise from the fact that atomic radiation may produce a delayed reaction.

Thus, a worker unknowingly injured today by overexposure, but who does not experience the effect of his injury until many months from now, may have a hard fight to collect workmen's compensation benefits because of the time limits involved in filing a claim.

Notifying the union

It is important that your union contract require that whenever a radioactive isotope is introduced into the plant, the union must be notified of its installation, and of the type of isotope being used.[15]

B. Industrial Union Department, AFL-CIO. Representatives of unions affiliated with the Industrial Union Department, AFL-CIO, Washington, D. C., met in December, 1958, at the instance of Walter Reuther, its president, to set up an Atomic Energy Technical Committee. The committee's chairman, Benjamin Sigal, is general counsel for the IBEW and was chief of the legal staff for the unions which intervened in the Detroit Edison case now pending before the AEC. (The unions have charged that the Power Reactor Development Company's proposed reactor at Monroe, Michigan, presents a radiation hazard and that the AEC in granting a construction license has ignored its own licensing regulations.) The committee's secretary is Leo Goodman, atomic energy advisor for the United Auto Workers and representative to the International Confederation of Free Trade Unions at the Atoms for Peace Conference in Geneva in 1955.

C. Other Unions. Other unions which have shown especial concern in good safety standards, and are developing programs of membership education and training in atomic energy safety problems, are the United Association of Plumbers and Pipe Fitters, many of whom are employed by atomic designers; the Oil, Chemical and Atomic Workers, whose members are employed in the petroleum industry in catalytic cracking plants, in leak testing, pipeline interface markings, and many other radioisotopic tracer operations; and the International Brotherhood of Boilermakers.

The United Mine Workers, who have had long experience with health inspection for physical hazards, have an arrangement by which management and labor *jointly* hire the health inspector. It may be useful

[15] International Union of Electrical, Radio and Machine Workers, AFL-CIO. Education Department, *IUE Leadership Manual for Shop Stewards* (n.d.), p. 68-72.

to study their experience in anticipation of similar demands or suggestions in atomic energy industry.

D. AFL-CIO Conference on Atomic Radiation Hazards. The case for something more than a voluntary compliance program was put with vigor by the director of the Washington Office of the United Automobile Workers at the 1957 AFL-CIO Conference on Atomic Radiation Hazards.

> * * * [Radiological] experts are not experts in legislation, they are not experts in what it takes through collective bargaining to establish good safety standards, good safety practices in the plant. They are not experts in being on the receiving end of safety regulations that are not enforced. I daresay they are not experts, either, in knowing how states compete with each other to drag standards down, so that the prevailing standard is likely to be the standard of the worst state.
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> * * * * *
>
> * * * Handbook 61, issued by the Department of Commerce, National Bureau of Standards * * * is called Regulation of Radiation Exposure by Legislative Means.
>
> * * * * *
>
> * * * they point out that there are three possible solutions for the problem of legislating protection against this radiation hazard. The least restrictive solution they point to is that AEC will screen all the applicants for radioisotopes, and the various medical and industrial bodies will carry on educational programs for their members. Education is the chief thing they would rely on if this solution were adopted.
>
> The second possible solution would be that users of sources of radiation would be registered. In general, it says, the users would use the processes carefully, knowing they were open to inspection.
>
> Now I quote: "The third and most restrictive solution would be one calling for inspection and licensing of all radiation sources. It would be costly and difficult to administer. It does not lend itself to co-operative effort on the part of the control agency and the user. It is not recommended."
>
> * * * * *
>
> * * * "For many years it has been the informal attitude of the National Committee on Radiation Protection—that radiation legislation is not only unnecessary but might be definitely harmful."
>
> * * * * *
>
> * * * "The NCRP thinks that voluntary control based on adequate education often may prove best."
>
> * * * * *
>
> This Volume 61 is today setting the tone, and it is the only thing we have that is official as to what kind of legislation, if any, we should have. Actually it is a strong argument against any enforceable regulations.
>
> * * * * *
>
> * * * the Atomic Energy Commission * * * has issued a detailed safety code, * * *
>
> * * * * *

On the whole, however, it is a very sketchy regulation, particularly on its requirements as to how surveys, radiation surveys, are to be made of the workplace, and as to how the personnel monitoring is to be carried out. Nor does the regulation give the worker any right to have access to his exposure record which the employer is required to keep.[16]

So there is plenty of room for collective bargaining in this field, even with the AEC regulation. The right of the worker to get that exposure record is one thing we should bargain about. The right of the union to get the record of this workplace survey, this monitoring of the area that will be done, and how it is done is another. And a very important matter will be to insist that the operation of the plant using isotopes gear its objective to keeping below the maximum permissible exposure level.

I don't mean a little below, I mean far below, because this is the only way to be sure that overexposures are not going to occur.

* * * * *

* * * This is the kind of question on which our unions must provide experts, on the need for legislation, on safety codes, and to see that this atomic age does not impose these new hazards on workers without their consent. Consent, mind you, based on knowledge, because without knowledge consent becomes compulsion.

* * * * *

I wonder whether we [in the labor movement] shouldn't raise questions * * * as to whether too large a part of this burden that the scientists seem to be willing to accept as the price of the atomic age—this mutation burden— * * * is to be borne by those who are occupationally exposed?

* * * * *

* * * I don't know how much risk we ought to take for the technological advances, nor am I able to say how much of that risk should be borne by the workers. It is the price we pay for progress, but as usual it appears that the workers are going to pay it.[17]

In closing this section, the remarks of an academic authority on workmen's compensation, participant in a California conference on labor and atomic energy (held in May, 1957, at Long Beach), may be quoted:

The development of nuclear science and reactor personnel under government auspices was carried on by the nation's leading scientists with a deep respect for radiation hazards. With a change from a scientific to an engineering basis, operating attitudes may well change, with a resulting increase in injuries. Furthermore, the real results, the total injury record, may not be available for many years, because of the slow development of radiation diseases.

* * * we can say with reasonable confidence that even if the most optimistic forecasts prove valid, radiation disease will nevertheless represent an increasingly larger *proportion* of industrial injuries.

[16] Since this date, on May 13, 1958, the AEC Manual, Chapter 0525, established the policy of informing AEC and AEC contractor employees of occupational radiation exposure records.

[17] AFL-CIO Conference on Atomic Radiation Hazards, *Extemporaneous Statement by Donald Montgomery* (February 28, 1957).

> This follows from the fact that an increasingly larger part of industrial operations will be concerned with radioactive material. In any case, even if the volume should prove as small as we may most optimistically hope, every such injury will represent a great personal and family tragedy, and it is humanly and socially essential that procedures be established to provide for such tragedies whatever their number may be. We should have small patience for the approach which avers that because a tragedy may involve a relatively small rather than a large number of people there is no cause for taking effective action. On the contrary, it may be asserted that the smaller the number the better the reason for comprehensive and adequate remedial measures; the smaller the number, the more financial resources should be available to take care of them fully and properly.[18]

Maximum Permissible Exposure Levels. The International Commission on Radiological Protection (ICRP) established in 1928 during a session of the Second International Congress of Radiology, first set up standards suggesting the upper limits of radiation exposure which should be permitted if harm was not to come to the individual. As use of X-rays in medicine and industry has increased, and as scientific knowledge of radiation-effects increases, these standards, and those of national protection committees in most industrial countries, have grown more strict. Until relatively recently the prime consideration in deciding the maximum permissible doses of ionizing radiation was the effects of exposure on the individual. But beginning in the early years of the 1950's increasing attention has been paid to possible genetic effects of exposures on whole populations.

The chief of the National Committee on Radiation Protection and Measurement (United States), speaking at the Geneva Conference in 1955, said:

> * * * a major problem * * * directly influences our whole philosophy with regard to radiation protection and centers about the fact that the genetic effects of low-level exposures of a large fraction of the population may ultimately decide the permissible dose for all persons. * * *
>
> The current maximum level of permissible exposure for the single individual rests on the philosophy that exposure at this level throughout his adult lifetime is believed unlikely to cause him bodily injury at any time during his lifetime. Based on this major premise, the present *mpe* levels are acceptable both from the plant and the individual's viewpoint, and do not appear to involve an unreasonable working risk. Such levels are, however, also based on the additional premise that only a small portion of the world population will be so exposed up to the close of their reproductive lifetime. * * * where large population groups may be exposed, the preservation of the genetic balance of the population may require that the exposure per individual be limited to only a very small fraction of the individual occupational exposure.

[18] California. University. Institute of Industrial Relations, "Atomic Energy and Workmen's Compensation"; by Herman M. Somers (unpublished paper, May 1957).

* * * Before facing the problem of determining how much additional radiation may be received by nonoccupational groups, it is essential to make a careful evaluation of existing exposure patterns. Since the prime consideration will be genetic effects, such exposure evaluation should be limited to the gonads of persons before the close of their reproductive lifetime.[19]

Two years later, he told a group of American businessmen:

For the past 25 years, permissible occupational exposure levels for radiation in this country * * * have been based primarily on controlling the dose received by an individual—on the premise that a whole body dose of 0.3 rem per week for an indefinite period of time would not produce any detectable harmful effect on the individual.

* * * The present level * * * assumed that only a small portion of the total population would be subjected to radiation exposures approaching the maximum permissible * * * levels. An estimate may be made on the high side that there may be as many as 500,000 workers occupationally exposed to radiation in this country—about one-third percent of our total population. The occupational exposure of this group would be regarded as genetically relatively unimportant compared with medical and other sources of radiation exposure. Shortening of average life expectancy in the radiological profession has been reported by the National Academy of Sciences from an estimated average total dose of 1,000 roentgens. * * *

* * * The National Committee on Radiation Protection has since decided to limit occupational gonadal exposure to individuals to about 100 rem up to the age 40 and up to 250 rem by age 70. In these considerations, emphasis has shifted from the exposure of the individuals to exposure of the population. It has to some extent shifted from weekly limits (or monthly) to lifetime limits. In practice, the new lifetime limits cannot be considered adequate for all occupational and regulatory purposes * * *

* * * We cannot easily measure and record a total accumulated exposure of 250 rem over a period of 50 years (up to age 70). It would still be impractical to attempt to measure 50 rem over a period of 10 years. Some unscrupulous employers might wish to allow an individual to receive his full 10-year dose in 3 years—and then simply fire the employee as no longer useful for radiation work.

* * * Accordingly, the NCRP Executive Committee agreed upon the following patterns for maximum exposure levels. The basic figure of 0.3 rem per week will be continued together with a penalty allowance of 3.0 rem in 13 weeks. So also will the allowance of 15 rem per year (allowing for two weeks vacation).

The basic figures will be subject to a further limitation to prohibit an accumulation of dose too rapidly, not more than 5 rem in a year. * * * At any given age of 18 or over, an individual will be allowed to accept a dose, provided that his total accumulation

[19] United Nations, *Proceedings of the International Conference of the Peaceful Uses of Atomic Energy.* (1956), pp. 196-197.

in rem will not be in excess of a number equal to five times his age beyond 18 years, or

$$\text{M. P. D. (at age N)} = 5\ (N - 18)\ \text{rem}$$

* * * Average weekly, monthly or quarterly levels may be used with monitoring conducted accordingly under the new rule. The choice of procedure will depend largely on the economics of a particular situation. * * *

These * * * exposures are not modified by any radiation dose received for medical reasons. On the other hand, it would be prudent for the employer to take into consideration any especially large medical exposures in assigning individuals to radiation work.[20]

A report by the Atomic Industrial Forum in September, 1957, stated that the AEC had not yet amended Part 20, Code of the Federal Register, to make its regulation consistent with the new recommendations.[21] However, the report continues:

In introducing its recommendations, the NCRP observed that "the risk involved in delaying the activation of these recommendations is very small, if not negligible. * * * Because of the impact of these changes and the time required to modify existing equipment and installations, it is recommended on the basis of present knowledge, that a conversion period of not more than five years be adopted within which all necessary modifications should be completed." [22]

The Department of Labor revised its order on the maximum permissible exposure of 16- to 18-year-olds on May 18, 1957.[23]

Explaining the purpose of the revised order, the Labor Department statement adds: " * * * Exposure to radiations is * * * particularly hazardous and detrimental to the health and well-being of minors whose period of exposed employment would normally exceed that of adult workers. However, the limit of 10 percent (of the maximum permissible radiation exposure limits recommended for adult workers) * * * is considered ample to compensate for the longer period of employment during which 16- to 18-year-old employees would be exposed to radiation. In addition, this limitation will provide a margin of safety in the event young persons are found to be more susceptible to radiation injury than adults." [24]

Community Health and Safety

The problem of protecting the working personnel in atomic energy plants must be distinguished, although it cannot be wholly separated, from that of protecting the health of the general public from the dangers of a contaminated environment—properly a responsibility of departments of public health. And in order to discover how much man-

[20] Atomic Industrial Forum, Inc., *Summary of Meeting on Utilization of Nuclear Standards by State Governments* (1957) (mimeographed).
[21] (*Code of Federal Regulations*, Title 10, Part 20).
[22] Atomic Industrial Forum, Inc., *Atomic Industry Reporter* 121, September 25, 1957.
[23] *Code of Federal Regulations*, Sec. 4.57 of Title 29, Order No. 6, dated May 18, 1957.
[24] Atomic Industrial Forum, Inc., *Atomic Industry Reporter* 104, June 23, 1957.

made sources of radiation are adding to air, water, and food, it is necessary to make baseline studies.

Environmental surveys. The division of radiological health of the U. S. Public Health Service, a division active since July 1, 1958, has a budget of $608,000 for fiscal 1959 for monitoring the environment. The service had been active for about five years before this, in air and rain surveillance. It has now set up 43 stations in the states and territories for measurement of radioactivity in the air, 45 stations for testing water, and 9 milk sampling points. Samples are analyzed once monthly. [25]

The chief of the Bureau of State Services pointed out in March 1958:

> Baseline data are needed as a guide in the selection of reactor sites and as a gauge for determining how much and how rapidly radioactive waste from industry and from fallout is being added to the environment in any given area.
>
> * * * To date, studies of permissible radiation doses have been based primarily on observations of persons exposed to abnormally high radiation dosages and are, at best, estimates. In order to evaluate the public health significance of radiation, we need to devise means of measuring the far more subtle effects of prolonged, low-level exposure. Since the damage from this type of exposure extends over years and generations * * * (the difficulties involved are obvious.) We place a high priority on such research * * * needed to provide better bases for practical radiation dose limits and to relieve exaggerated fears.
>
> * * * A far more important potential source of environmental radiation exposure (than weapons testing) is the rapidly growing number of power reactors based on nuclear fission. * * *
>
> * * * To date, only a few communities have any accurate idea of the sources and amounts of radiation to which their people are exposed. Every community should be taking this first step of assessing the radiation burden.
>
> * * * Since we recognize that all radiation is harmful and that its effects are cumulative and irreversible, the price of delay in the vigorous pursuit of research and control efforts might well prove to be intolerably high. [26]

The report of the Assembly Committee on Public Health, Subcommittee on Air Pollution and Radiation Protection, treats of the monitoring now going on in California under the auspices of the State Department of Public Health, the U. S. Public Health Service, and other agencies. Many other states have similar studies.

For example, a survey of the Delaware River Basin has recently been initiated by an interstate commission in which Delaware, New Jersey, Pennsylvania, Philadelphia, the U. S. Public Health Service, and the Maritime Reactors Branch of the AEC are co-operating. It will study the distribution of radioactivity in water, soil, and plant and animal life at eight stations along the river, to serve as a check

[25] *Atomic Energy Newsletter* (September 30, 1958), p. 1.
[26] David E. Price, "Radiation as a Public Health Problem," *Public Health Reports* 73: 197-202, March 1958.

for the future on the effects of the use of isotopes and nuclear-powered ships. The *N. S. Savannah* is being built at Camden, N. J.[27]

A similar study is attempting to establish a base line of radioactivity near the Shippingport nuclear plant in Pennsylvania, so as to be able to determine later whether the level has changed after the plant has been operating for a time;[28] while the New York State Health Department's division of environmental sanitation has begun a limited study of the background radiation in the Hudson River Valley, near Consolidated Edison's nuclear power plant at Indian Point, N. Y.[27]

On a still more ambitious scale, the National Academy of Sciences' Committee on Pathological Effects of Atomic Radiation has announced a plan for a 20-year study, costing from $740,000 to $1,500,000 a year, to determine the natural background radiation, together with such sources as X-rays and radiotherapy, to which American populations are exposed. Two groups, one in an area subject to high incidence of cosmic rays (probably the Colorado plateau), the other from a sea-level area (probably on the West Coast) would be studied. The proposal will be presented to Congress within the year, according to the committee's chairman.[29]

These are all signs of the seriousness with which this aspect of the problem is being taken.

CONTAMINATION FROM FALLOUT. Decisions as to the testing of atomic bombs are obviously not within the competence or authority of state agencies. But a state whose geographical position renders it vulnerable to more or less direct effects of fallout, and all states (insofar as delayed fallout is distributed in worldwide fashion) must face costs and responsibilities growing out of national policies and decisions. Representative Holifield expressed the view, as well, that it would be wise to secure scientific judgment on the significance of fallout from an agency independent of the bomb development program. In discussing the congressional hearings on radioactive fallout in an article published about a year ago, he wrote:

> I should like to suggest that the National Academy of Sciences revise and bring up to date its report on radiation.[30] The data in this report are now more than 20 months old (in January, 1958). There is competent opinion to the effect that the British Society [31] had more detailed research on strontium 90 than did the National Academy, and that their findings are less optimistic. The official policy of optimism of our own government seems to be based in part on the dated National Academy report.
>
> The evaluation group should include some new scientific faces. I do not believe that AEC scientists should dominate the study. Without reflecting on the competence or integrity of AEC scientists, I believe that the public would have more confidence in a report more widely based in the scientific community. The AEC

[27] *New York Times* (January 6, 1959)

[28] Berwyn F. Mattison, "Radiation—A Major Public Helath Problem," *American Journal of Public Health*, January 1958; and Karl L. Mason "Control of Radioactive Liquid Wastes in Pennsylvania," *Public Health Reports*, V. 73, 895-901, (October 1958).

[29] *New York Times* (January 7, 1959).

[30] He referred to National Academy of Sciences. National Research Council, *A Study of the Biological Effects of Atomic Radiation* (1956).

[31] The study referred to here is Medical Research Council. Her Majesty's Stationery Office, *The Hazards to Man of Nuclear and Allied Radiations* (1956).

is more than a scientific fact-finding agency. It is also a policy-making and a weapons-producing agency. * * * I see in the AEC role a conflict of interests. Is it prudent to ask the same agency both to develop bombs and to evaluate the risks of fallout? [32]

REACTOR LOCATION. The problems involved in designing and locating nuclear reactors and other potential sources of large-scale environmental radiation present another order of challenge to state agencies. A sanitary engineer, representing the AEC, developed for the Geneva Conference on Peaceful Uses of Atomic Energy some of the considerations which make the location of atomic reactors uniquely difficult; and outlined certain criteria which seem appropriate in evaluating site location.

Every new industry has * * * responsibility to appraise * * * the impact of its operations on community living and the natural resources of the nation which it serves. * * * Its sources of raw materials, its production plants, its research and development laboratories and its channels of transport and distribution have a wide variety of direct and indirect contacts with people and the communities in which they live.* * * Even though (the) industry may enter an isolated unpopulated area it still has an obligation. * * * It is axiomatic that people follow industry. Conceivably through use of atomic energy, an almost virgin area today may be the site of a city or a vast industrial complex.

* * * * *

In the new atomic energy industry the obligation to assess its environmental impact is all the more profound because of: (1) the unique characteristics of its products and wastes—especially those of long-lived radioisotopes; (2) the relatively limited knowledge as to the effect of cumulative radiation on living organisms; (3) the continuing changes in nuclear technology; (4) the relatively large volumes of water used for heat exchange and other purposes; (5) the trend of the industry to expand into more populous areas; (6) the current lack of knowledge * * * concerning the products and operational hazards of the industry by regulatory public agencies normally responsible for public health, safety and the protection of natural resources.

* * * * *

Experience has revealed that a proper appraisal of environmental problems of the atomic energy industry requires * * * such professionals as nuclear, health and biophysicists; physical and nuclear chemists; structural and ground water geologists; nuclear, chemical, sanitary, and safety engineers; industrial hygienists; biologists; meteorologists; hydrologists; mineralogists, public planners and others.

* * * Teams of specialists * * * advise on such matters as: (1) site selection for plants; (2) availability of water for process and domestic uses; (3) relationship of various units in a plant complex to one another; (4) the type and capacity of safety and waste treatment required; (5) points of discharge of waste effluents;

[32] Chet Holifield, "Congressional Hearings on Radioactive Fallout," *Bulletin of the Atomic Scientists* 14: 52-54, January 1958.

(6) natural dilution factors in nature which may be taken advantage of in disposal of wastes; (7) selection of significant monitoring points for checking the results of operation; (8) ultimate fate of wastes from day-to-day operations or in case of an accident, loss of product and wastes to the environment; and (9) effect of releases of this kind on the public health or natural resources.

* * * Usually, but not always, it is the large plants which present the more serious environmental hazards. Of special importance * * * (are) nuclear reactors and chemical processing plants. * * * This is not to say that selection of sites for * * * research laboratories, feed material processing and fabricating plants and special test and storage facilities are not also important.

* * * * *

In site selection, serious consideration should be given to the possibility that a plant may be enlarged, or its functional processes changed with resultant greater hazards. When a plant or site planned for one purpose is put to a new use it is important that such basic services as utilities, waste disposal systems and points of release of waste effluents be re-studied to ascertain their adequacy for the newer use. Such modification should be discussed with those public officials who are responsible for public health and safety in the area.[33]

The question of zoning for reactor location is one which state and local agencies cannot evade, for the most scientific and scrupulous survey by a federal agency may not reflect local plans and evaluations. Dietz and Harris point out that

* * * the location of a nuclear reactor is of concern to the Public Utilities Commission, both from economic and health and safety considerations; the Department of Public Health, the State Water Pollution Control Board, local air pollution districts, the Fish and Game Commission, the Department of Water Resources, the Department of Motor Vehicles and the California Highway Patrol, the State Civil Disaster Council and innumerable local bodies in the vicinity of the proposed facility (zoning and planning boards, county and city officers, etc.). With respect to the operation of reactors, the Public Utilities Commission is vested with authority to require safe industrial practices and to provide for the protection of the public and patrons of the utility. (Cal. Pub. Util. Code., Sec. 451,761.768). Industrial safety and public health are normally within the jurisdiction of the Department of Industrial Relations and the Department of Public Health.[34]

It is generally agreed that since the matter is not a scientific question to be settled by a formula but one of weighing alternate values, the representatives of the citizens to be affected should have a voice in the decision-making. An interesting exchange during joint committee hearings between Representative Holifield and Dr. A. Wolman, AEC expert on reactor safety questions, brings out the issues clearly.

Representative Holifield. I might say while I was in England recently, I talked to the gentleman who was in charge of the site

[33] United Nations, *Peaceful Uses of Atomic Energy* (1956), p. 298 ff.
[34] H. A. Dietz and Albert W. Harris, Jr., "How Shall California Government Meet the Challenge of Atomic Energy?" *Hastings Law Journal* 8 (2), March, 1957.

location and also I talked to the man in the same position in Norway, and the chairman here talked to the man in Belgium.

In the Scandinavian countries, the site is the first thing that is considered, and unless the site is approved, all the rest of it goes by the board.

* * * It is obvious that a dangerous type of reactor built somewhere out in the wilderness would not represent the hazard of one built in a city like Los Angeles.

Dr. Wolman. Our dilemma is another one. I think it is one which the committee and the public will have to recognize.

Increasingly our reactors, certainly for power and for heat purposes, would serve the greatest usefulness as close to the population as you can get.

Representative Holifield. This is true from the standpoint of economics. The same thing is true of powerplants. We are transporting kilowatts from the Hoover Dam to Los Angeles, which is several hundred miles, as you know, and we have a loss on the way.

Dr. Wolman. Yes.

Representative Holifield. This loss you would have if you located a reactor at some distances, say 75 or 100 miles—you would have more transmission loss—in getting the electricity into the center of us. We have absorbed that cost in this case that I mentioned.

Certainly it would seem that this is one of the cost factors that would have to be absorbed if safety of population is at stake. It is just an additional cost factor that has to be considered.

Dr. Wolman. I posed the probelm not in order to indicate that the conclusion of the committee has been to bring them as close as possible, but I pose it because it is a problem for the committee.

Representative Holifield. In the Scandinavian countries, they are building these reactors underground, which gives you an added sense of care and precaution. This again may increase the cost of construction. I am not sure.

Where it is necessary to put it close to a populated area, it does add a note of safety which you do not have in an above-the-ground reactor.

Dr. Wolman. Our Committee is, I think, confronted with that equilibrium that you so well described.

I am not certain at all that all of us have resolved those value-judgments in relation to distance and population. I am sure that Dr. McCullough would say to you for the Committee that there are very serious questions that arise with respect to newer ones and more numerous ones that will grow in our country, as to whether the site selection does not become the key answer as the art and science advance.

I, for one, place the site selection, perhaps because of past experience in my own professional function, as the No. 1 consideration. That has to be balanced against the desire of everyone in our Country to move this art forward as rapidly as possible.

* * * * *

Representative Holifield. That is why we chose Hanford and Oak Ridge and those more or less isolated areas, and also Savannah.

Dr. Wolman. I would point out that the country is smaller as we move into increasing numbers and types than all of us thought it was. Of course, it is not as small as Norway or even Sweden or England.

* * * I wish there were a mathematical formula by which we could equate distance and population and safety. Inasmuch as there is not, each of us on the committee is burdened with that conscientious task of writing that equilibrium.

* * * * *

Representative Holifield. And the responsibility which you carry is really the responsibility of whether this art shall go forward or not. If you fail to safeguard the people and we have one large reactor incident in this country close to a populated center, and several thousand and maybe a hundred thousand people are contaminated by one mistake, this will put the finish on atomic energy for a long time as far as further progress is concerned. The people just will not stand for it.

Dr. Wolman. That is right. But * * * the Committee has been in the course of its last 10 years of operations * * * accused, if not publicly, but privately, of retarding the development of the industry for the very reasons which you have discussed. That adds to our * * * dilemma.[35]

The question of site location is of course closely bound up with standards for the disposal of radioactive waste. Plant design, including containment buildings, can assure to a high degree of probability the confinement of emitted radiations from reactors to the reactor core and its immediate environs. But when nuclear fuel is removed from the reactor to be processed chemically for recovery of valuable plutonium and uranium, highly radioactive waste remains to be disposed of. There are also large volumes of low-level waste from laboratory, laundry, and decontamination operations.

State agencies are inevitably concerned with standards and procedures of disposal of such radioactive material.

Radioactive Waste Disposal. Extensive research is under way on uses of materials now being disposed of as waste, so as to salvage as much as possible for economic use, and to find more efficient methods of handling the residue.

Methods now being used include removal from waste of the more hazardous isotopes (such as strontium 90) for selective disposal; and disposal of the remainder to oceans, pits, deep or shallow wells, and natural formations like salt domes. Other methods include fixation in ceramic materials and pyroprocessing. Recently, however, a clarifying amendment to AEC's regulations prescribing standards for protection against radiation forbids a licensee to treat or dispose of any licensed material by incineration (23 Fed. Reg. 5721, effective August 29, 1958).[36]

[35] U. S. Congress. Joint Committee on Atomic Energy, *Development, Growth, and State of the Atomic Energy Industry*; hearings . . . pursuant to Section 202 of the Atomic Energy Act of 1954, February 19-March 4, 1958 (85:2, 1958), p. 122-23.

[36] *Atomic Energy Law Reports* (August 5, 1958), para. 9704.

The highly radioactive isotopes previously selectively removed are then usually stored in tanks, thus concentrating the principal sources of radioactivity at a few processing locations. There are major disadvantages to this solution, however; it is costly, and the difficulties of safe transportation are great. The AEC is now building a $6 million pilot plant in Idaho to reduce these wastes by a calcining process to solids approximately one-seventh of their present bulk, which can then be stored in concrete vaults. This plant is scheduled for completion by January 31, 1960, after which full-scale plants for the process may be built. Meanwhile, Dr. Abel Wolman, quoted earlier, told the Joint Congressional Atomic Energy Committee during its current hearings (January, 1959) that no satisfactory economic solution has yet been found for disposing of the highly radioactive materials which will be produced by atomic industry. He said that about 60 million gallons of high-level liquid wastes are now stored in tanks in the United States and that about $200 million has been invested in waste-handling and storage facilities. By 1980, he predicted, there will be need to store or dispose of another 100 million gallons of such waste.[37]

Reactor wastes, after removal of the most dangerous isotopes, may be diluted with water and stored temporarily in tanks to reduce the activity to a level less than the maximum permissible concentration for disposal in sewer systems. Other types of waste are compressed or condensed and placed immediately in storage tanks. Dr. James G. Terrill, Jr., Assistant Chief of the Division of Radiological Health, Bureau of State Services, U. S. Department of Public Health, states that on the basis of calculations on the Shippingport reactor, quantities of the order of 100 curies per day before treatment will be produced at power reactor sites—a figure which he says will doubtless need revision with further experience.

As for waste created by use of radioisotopes in industry, Dr. Terrill says about 90 percent are in sealed sources which do not produce environmental contamination unless the capsule is ruptured by accident. Radioactive iodine (131), phosphorus (32), and tritium are major isotopes which might reach air and water in appreciable quantities. Both iodine 131 and phosphorus 32 have short half-lives which automatically limit their long-term effects. Tritium has a longer half-life, but its lower-energy beta emission reduces its hazard potential. Thus, public health hazards from the isotopes program arise chiefly through their widespread use, their transportation, and the possibility of their being used without proper precautions.[38]

Nuclear Science & Engineering Corporation conducted in 1957 a study for AEC of current methods of treatment and disposal of radioactive wastes. Their report pointed out a problem in the application of the National Bureau of Standards' maximum permissible concentration criterion for the disposal of low-level wastes. There is ambiguity as to whether the *mpc* criterion applies at the point (a) when the user loses control of the wastes; (b) when the waste leaves the user's property; or

[37] *San Francisco Chronicle* (January 29, 1959).
[38] James G. Terrill, Jr., "Some Public Health Aspects of Radioactive Wastes," *Bulletin of the Atomic Scientists* 14: 44-45, January, 1958.

(c) prior to the point downstream where the water will be utilized again.[39]

Dr. Terrill also found some vagueness in the NCRP and AEC regulations—in that they do not specify the quantities of a given radioactive mixture which may be discharged into a river, nor where the measurements should be made, how many samples should be taken, and how they should be analyzed, averaged, reported, and evaluated. Because they are within the range of natural radioactivity, standards at these levels present a measurement problem to industry, reactor designers, and health agencies. He urges that standard techniques be developed, which can be reported and interpreted with uniformity.[40]

The Nuclear Science & Engineering study suggested that the following standards would be useful with regard to the temporary tank storage of wastes being "cooled" before final disposal:

1. Minimum land area per tank;
2. Monitoring pattern and frequency for tank farm and environs;
3. Proximity to public places;
4. Tank specifications and tank system arrangement;
5. Geological and meteorological specifications for site selection;
6. Corrosion allowance for effect of radiation;
7. Allowable leakage prior to transfer of wastes to new tanks.[41]

The National Academy of Sciences is quoted as bringing out an aspect of waste disposal leakage into air or into water systems which has hitherto been given little emphasis:

> * * * the presence of radioactive wastes in quantity will have a profound effect on certain non-nuclear industries which may be damaged by air or water contaminated with radioactive wastes. Numerous wet processing industries are likely to be detrimentally affected by radioactive wastes, even in slight concentrations. Among this vulnerable group are those requiring water of the highest purity, such as for the manufacture of the photographic film. Other industries which should be alerted to the problem are pharmaceutical manufacturers and food processing companies. It is not possible at this time to enumerate with assurance the industrial processes which can be completely eliminated as subjects of this potential hazard. * * *[42]

California agencies have evinced strong interest in knowing the amounts of radioactive waste which is being disposed in coastal waters and in the possible effects of marine disposal on marine life, including the possibility of a food-chain involving fish in the human diet.

Of the 15 companies currently licensed AEC to provide waste disposal service, six are permitted to dispose at sea: Isotopes Specialty Co., Burbank, California; Reed-Curtiss Nuclear Industries, Culver City, California; Nuclear Engineering Co., San Francisco; Industrial Waste Disposal Co., Houston, Texas; American Mail Lines, Ltd., Seattle,

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[39] Atomic Industrial Forum, Inc., *Atomic Industrial Forum Conference Paper no. 57* (October, 1957).
[40] James G. Terrill, Jr., *op. cit.*, p. 44-45.
[41] Atomic Industrial Forum, Inc., *op. cit.*
[42] Quoted by Benjamin C. Sigal in an extemporaneous statement at the AFL-CIO Conference on Atomic Radiation Hazards (February 28, 1957)—mimeographed.

Washington; and Crossroads Marine Disposal & Salvage Corp., Boston, Massachusetts.

The Houston company disposes prepackaged material encased in reinforced concrete into the Gulf of Mexico, beyond the continental shelf about 180 miles southwest of Galveston at a minimum depth of 1,000 fathoms.

American Mail Lines of Seattle is licensed to receive and dispose of byproduct materials and source materials, packaged by Boeing Airplane Company, Seattle, and to carry them to sea in an isolated section of its ships during regular commercial voyages. Not more than 10 c of byproduct material or 15 pounds of source material may be carried on one ship. Disposal is at least 150 miles off the continental shelf in a minimum depth of 1,000 fathoms.[43]

The agreement in California is reported in the companion study to this one, issued by the Assembly Interim Committee on Public Health, Subcommittee on Air Pollution and Radiation Protection.

As was developed earlier,[44] radioactive waste disposal at sea both from land-based and from marine reactors promises to require standard-setting by an international agency; and requires extensive research on unsolved problems on the ocean processes. A National Academy of Sciences publication comments that our knowledge of most of the processes in the oceans is altogether too fragmentary to permit precise predictions of the results of the introduction of a given quantity of radioactive materials at any particular place. With respect to the effect of waste products on fish caught for human consumption, these live primarily on the suface layer of the ocean; but the problem is complicated by the fact that some surface-layer fish do much of their feeding in the deeper layers, and much of the food for surface-layer fish consists of small animals which perform vertical diurnal migrations from several hundred meters depth to the surface.[45]

At hearings in San Francisco on October 6 and 7, 1958, before the Senate Fish and Game Committee, there appeared differences of opinion on the part of experts as to the application of the terms "low-level" and "high-level" in relation to permissible sea disposal standards. One witness interpreted "low-level" in terms of curies per gram of disposable material, while another stated that for all practical purposes the term applied to any curie concentration which, under the packaging conditions obtaining, could be safely transported for sea disposal. It was also brought out that while the concrete containers are believed capable of resisting disintegration through the action of sea water until the half-life of the contained material is at a level safe enough to be dispersed in waters at that depth, judgments in this respect are necessarily conjectural. Some decisions as to standards which can be uniformly interpreted would seem to be needed here.

Transportation. The domestic transportation of radioactive materials and certain other products and materials involved in the production

[43] *Atomic Energy Newsletter* (August 5, 1958).
[44] Chapter IV, pages 103-104.
[45] National Academy of Sciences. National Research Council, *The Effects of Atomic Radiation on Oceanography and Fisheries* (1958) (Publication no. 551).

and use of nuclear energy may be subject to regulation by AEC; by four other federal agencies;[46] by states; and by local agencies.

Earlier, it was noted that a loophole appears to exist in the AEC's regulation through which a common carrier could, while obeying the letter of the law, assemble from a number of shippers amounts of special nuclear material which exceed the limits (proposed for shipment by a *single* licensee) as necessary to prevent accidental criticality.

This situation would appear remediable if common carriers were required to seek specific license to transport special nuclear material from the AEC; but at present the common carrier is regulated solely by the ICC. The ICC, meanwhile, has no regulations covering criticality conditions and no rules as to the amount of special nuclear material a carrier may accept and ship, although there are rules as to curies permitted per container.

An aspect of land transportation of radioactive materials which concerns state agencies is how to achieve the clear assignment of responsibility for action in case of a highway or rail accident resulting in release of such materials.

In discussing transportation problems which may arise from the passage of radioactive materials over California territory, Dietz and Harris say:

> While the Department of Industrial Relations is concerned with the safety of employees handling radioactive materials in transit, there is perhaps an even more serious problem in protecting the public within proximate range of the materials while in the stream of movement.
>
> On the federal level, the AEC is involved with licensees, while the Postal Department, Interstate Commerce Commission, Civil Aeronautics Board, and the United States Coast Guard are concerned with hazards arising from interstate commerce.
>
> With respect to intrastate shipments, the question of jurisdiction is not clear. The Department of Motor Vehicles and the California Highway Patrol have extensive powers over the use of highways. However, there are extensive statutory provisions dealing with the related problem of storage and transportation of explosives in the Health and Safety Code. Transportation by intrastate truck carrier is under the control of the Public Utilities Commission. Query: Are radioactive materials "explosive"? The California Aeronautics Commission has never asserted any regulatory jurisdiction over goods transported by air but might concern itself with the adequacy of the federal regulations. (Calif. Pub. Util. Code, Sec. 21243.) The Public Utilities Commission and Harbor Commissions must be concerned with hazards arising from water transportation and even hazards incidental to the use of piers by ships otherwise not subject to state control. (See Calif. Pub. Util. Code ("For-hire Vessel Act") Sec. 4501, et seq.) [47]

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[46] The Interstate Commerce Commission, in Title 49 of the Code of Federal Registers; the U. S. Coast Guard, in Title 46; the Civil Aeronautics Board, in Title 14; and the U. S. Post Office Department, in Post Office Services Circular 2, December 1, 1954.

[47] H. A. Dietz and Albert W. Harris, Jr., "How Shall California Government meet the Challenge of Atomic Energy?" *Hastings Law Journal* Vol. 8. No. 2, March 1957, p. 128 ff.

As the Director of the Occupational Health Services in Cincinnati puts it:

> The transportation and storage of radioactive sources involves untold regulatory bodies. There are instances of gross abuse in private car use to transport radioactive materials. State and local units should be actively involved in supervision of Atomic Energy Commission materials on the local level. Active encouragement and perhaps help, financial and otherwise, to the local units would take care of enforcement on the local level; maintaining a uniformity of standards under state supervision. Local enforcement provides an economical basis for the type of supervision required at the present time.
>
> Regulations imposed by local demand after an incident would be enacted without thought. If such demands are anticipated and the regulation making powers of the local political subdivisions utilized in advance of difficulty, it is possible to avoid much more of a problem than exists at the present time.[48]

The enforcement of ICC regulations regarding safe containers, signs, and so on, where non-AEC-regulated radioactive materials (like radium salts) are being transported, also presents difficulties. Their nature is illustrated by an incident occurring in December, 1958, in which a number of drums of radium salts were brought by truck from Pennsylvania to Oakland for disposal, being transferred from one truck line to another, the last drivers being unaware of their responsibilities when handling radioactive wastes classified as "Group 1, Class D poisons." The fact that the drivers could not locate anyone at the address at which they had expected to unload the shipment brought the case to the attention of AEC, and eventually to the Division of Industrial Safety which, along with the ICC, has jurisdiction. Examination then showed that the packaging of the radioactive wastes was not done in specified containers; the drums were found to have holes; and there was violation of the rule as to the number of radiation units per package and per shipment.

In many ways, the hazards to public and to workers will be less where reactors are concerned than where the transportation and use of bulk radioactive materials is involved. For the reactor companies have millions of dollars involved in the plant, contamination of which requires extremely expensive and time-consuming interruption of service; consequently their own interest in top-safety working conditions may be expected to make self-regulation realistic. But in the industrial plant whose insurance conditions now routinely require X- or gamma-radiographic inspection of materials and construction; or in other operations in which the use of radioactive materials is comparatively incidental to the major processes, careless handling is much more likely to occur. The incidents which have received greatest publicity in the press are of this nature.

[48] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 25.

Medical Uses of X-rays and Radioactive Materials. The report of the United Nations Scientific Committee, in estimating doses to which populations are exposed, divides them into three categories: natural; manmade (except environmental contamination); and environmental contamination. As to the sources within the different categories, and relative amounts attributable to each, the report states:

Natural Sources of Radiation. Man is exposed to radiations from: (a) external sources, namely cosmic rays and terrestrial radiations from radioactivity in the ground, the air and building construction materials, and (b) internal sources such as the radioisotopes potassium-40 and carbon-14 which are normal body constituents, radium and thorium deposited in bone and radon, thoron and its disintegration products in solution in blood and tissues.

* * * * *

Manmade Sources (except environmental contamination). At the present time radiation exposures from manmade sources (excluding environmental contamination) arise principally from:

(a) Medical uses of X-rays and radioactive materials,

(b) Industrial and research uses of X-rays and radioactive materials, and

(c) Other sources such as luminous dials of watches, television sets and shoe-fitting fluoroscopes.

Medical uses of X-rays and radioactive materials are:

(a) Diagnostic uses of X-rays,

(b) Use of X-rays and external radioactive sources for radiotherapy, and

(c) Use of radioactive isotopes as internal sources for diagnosis and therapy.

* * * * *

The Committee notes that systematic measurement and recording of the exposures of medical, industrial and research workers is desirable since some individual doses are likely to be relatively high.

Watches and clocks with radioactively luminous dials give an annual genetically significant dose of about 1 mrem. X-rays from television receivers contribute less than 1 mrem. X-rays from shoe-fitting fluoroscopes contribute still less, as they expose a relatively small number of individuals, but might be an important hazard to the exposed individuals.

Environmental Contamination. Radioactive contamination of man's environment occurs as a result of nuclear explosions and may also arise from radioactive waste disposal and accidents involving dispersion of radioactivity. At the present time the radiation doses from these last two sources are negligible, but in the future they might become appreciable.

* * * * *

Summary and Conclusions. The exposure from these sources is summarized in a table which gives the genetically significant dose and the *per capita* mean marrow dose. The genetically significant

dose has been calculated for a 30-year period and the marrow dose for a 70-year period. These figures are relevant to the genetic burden and the possible induction of leukemia respectively. The contribution from occupational exposure is at present small compared to that from the other sources of radiation. Although immense quantities of radioactive materials will be produced in the future use of nuclear reactors, the exposure from this source is at present negligible and could in the future be maintained at very low levels by appropriate procedures.[49]

Table XIV

ESTIMATED DOSE FROM DIFFERENT RADIOACTIVE SOURCES[50]

(Computed from world-wide averages)

Source:	Genetically significant dose: Maximum for any 30-year period (rem)	Per capita mean marrow dose: Maximum for any 70-year period (rem)
Natural sources	3	7
Manmade sources (except environmental contamination and occupational exposure) [a]	0.5-5	Ranges beyond 7
Occupational exposure [b]	Less than 0.06	0.1-0.2

a. For countries having an extensive use of the radiation sources listed and reporting data to the committee.
b. Doses for certain technologically highly developed countries only.

Probably the most common use of radiation today is in the operation of X-ray and fluoroscopic machines, principally for medical uses, but increasingly as an industrial tool. Since World War II, California has had regulations dealing with employees using X-ray machines, both medically and industrially. Whether or not regulations should extend to protection of patients should be the concern of the Board of Medical Examiners and the Board of Dental Examiners, as well as the Department of Public Health.

Handling Accidents. The states in which atomic industry is heavily concentrated are beginning to organize to educate the public on the significance of different types of radiation accidents; to train local fire, police, highway patrol, and health agency personnel in duties they would be expected to perform in case of such accidents; to develop geographical lists of physicians trained in radiological medicine; and to create administrative machinery for the protection of the population in the event of a serious accident.

The accident histories of this and other states should be studied to see what may be likely types of occurrences in connection with the different types of industries located here.

Dr. C. Rogers McCullough, chairman of the AEC Advisory Committee on Reactor Safeguards, urges:

> There is no clear-cut simple way of handling accidents at the present time. The meteorological conditions which are likely to result in the most harm to the people are inversions in which case the radioactivity would go out in a rather narrow band. In most cases, it would take a rather minor movement of people, or keeping them indoors until the cloud passes, to make a big difference in the amount of damage that might be done.

[49] United Nations, *Report of the United Nations Scientific Committee on the Effects of Atomic Radiation* (1958), pp. 8, 9, 11, 14.
[50] *Ibid.*, p. 15.

> Some emergency plans are rather simple things, in which there is a system in which local and state police authorities see that people could be warned and, in some cases, moved. Moving large numbers of people needs studying further, and local and state people can do a great service in studying and finding a way of adequate, and at the same time practical emergency procedures.[51]

The problem of achieving adequate preparation without exerting an unnecessarily alarmist influence on people is a difficult one. But experience shows, most experts testify, that the existence of local committees for the protection of the population in the event of a serious accident is very reassuring to local opinion; while apparently the least successful and most alarming official policy is that which meets legitimate requests for the information needed for intelligent action with words of blanket comfort and enjoinders to trust the authorities. Full and frank informing of the public, in advance, as to the possible hazards of nuclear energy; as to the particular significance of one or another type of atomic incident; and as to which trained persons to call on in the event of accidents is by all accounts the safest as well as the most comforting policy.

Summary

A rough guide list of questions for state agencies adumbrated by this chapter may now be drawn up for the area of protection of public health and safety.

1. What further state and local support is needed and feasible to advance research on the biological effects of specific radiation exposures, in order to design realistic and effective protective measures?

2. What provisions need to be made to increase the number of persons trained for inspection and health monitoring of atomic energy industries?

3. What further inspection and regulation of X-ray and fluoroscopic operation is needed in California?

4. Do existing industrial safety or public health codes need to be revised to remove ambiguities or come abreast of best approved practice?

5. What further environmental surveys are needed, either to establish background radiation levels or to monitor the effects of reactor operations?

6. What monitoring programs (other than those now in effect or planned) are needed to protect the populace from the hazards of contamination of food or water due to bomb-test fallout?

7. What criteria for the location of power reactor, test reactor, critical assembly facility, and nuclear fuel reprocessing installations need to be developed for California communities? What type of organization will best insure that technical, citizen, and local governmental viewpoints are represented in developing such criteria?

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[51] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 11-12.

8. What further planning and regulation may be needed to insure safe disposal of radioactive waste of both high and low curie levels?

9. How can AEC, ICC, and state rail and highway regulation of transportation of radioactive material be co-ordinated? How shall inspection responsibilities be divided?

10. What instruction and training are needed to prepare the personnel of fire, police, highway patrol, and local health departments for their responsibilities in the event of atomic accidents?

11. What type of legislative or other action will best stimulate adequate planning and administrative organization on the local level for atomic emergencies deemed possible of occurrence in specific localities?

CHAPTER VII

SURVEY OF PROBLEMS RAISED BY NUCLEAR INDUSTRY

PROTECTION OF ECONOMIC INTERESTS

Workmen's Compensation [1]

Workmen's compensation problems fall both within the category of protection of health and safety and in that of protection of economic interests. This section will complete the discussion begun in the preceding chapter under "Health and Safety of Workers in Nuclear Industry."

The two states which lead in nuclear industry are also the two which have been most active and most adequate in providing for workmen's compensation.[2] Indeed, New York and California codes are regarded as models by most informed commentators in the field; and labor, in pressing for federal action to insure adequate protection, is likely to be satisfied should national legislation raise the standards of other states to the level of standards found in these two states. The legislative director of the AFL-CIO, quoted earlier, told the Joint Committee on Atomic Energy, at its hearing in February and March, 1958, that the last time he had checked into it, only two states—New York and California—were fully and realistically facing up to the problem.[3]

Nevertheless there remain areas in which problems exist. The 1957 annual report of the Committee of the American Bar Association, on Atomic Energy and the Law, stated that all workmen's compensation laws would require more or less modification to meet the unusual requirements of the atomic age.

> For example: What is to be done about successive radiation exposures, no one of which taken alone would produce injury? On whom shall the liability lie? How shall proceedings be brought?
>
> For another example, radiation from a single source may result in injuries in several states, as in the case of interstate transportation of radioactive substances, or a single wrongful discharge of radioactive wastes into the atmosphere or streams. What conflict-of-laws rules shall apply? Shall a separate cause of action arise in each state where radiation exposure occurs?

Then, moving to a catalogue of some of the special problems which arise in the field of workmen's compensation, the report continues:

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[1] Prof. Earl F. Cheit of the University of California Department of Economics was kind enough to read this section and to make useful suggestions.

[2] In an address to the AFL-CIO Conference on Atomic Radiation Hazards in 1957 Prof. Cheit listed 14 states (California, Connecticut, Indiana, Maryland, Massachusetts, Minnesota, Missouri, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Washington, Wisconsin) of which we can say with certainty that radiation cases will receive full coverage, unlimited medical benefits, and in general, the same protection offered all other injured workers.

[3] U. S. Congress. Joint Committee on Atomic Energy, *Development, Growth, and State of the Atomic Energy Industry*; hearings * * * pursuant to Section 202 of the Atomic Energy Act of 1954, February 19-March 4, 1958 (85.2, 1958) p. 307.

A. *Definition of Compensable Injuries*

1. Meaning of "arising out of and in the course of employment." Under typical interpretations these words limit recovery to accidents that occur *during working hours* or *in usual places where work is carried on.* * * * In some jurisdictions the manifestation of the injury must occur on the premises.

Moreover, since manifestations of injury from overexposure to radiation almost always are delayed, the phrase "in the course of employment" involves problems. For example, would a worker who is allowed to obtain possession of radioactive material through employer's negligence or during normal operations and then accidentally keeps it on his person overnight or for a week or month have been injured "in the course of employment?"

2. Meaning of "occupational disease," especially in connection with chronic exposure. * * * Proof that a particular radiation exposure is the cause of a certain injury is often impossible because of the natural background radiation and the cumulative effect of radiation overexposures, or because radiation injuries such as cancer, cataract, or sterility, can also result from other causes. Yet statistics show chronic exposure is very likely to cause or to be a contributing factor in causing these injuries. * * * Actual proof is difficult and some appropriate substitute in the form of statutory presumption may become necessary.

3. How should cumulative effects be handled? * * * When, for example, a worker shifts from one employer to another * * * should apportionment among employers be provided for? So-called "second injury funds" become of especial significance.

4. How should radiation injuries causing no wage loss or diminution of earning power be handled? Workmen's compensation statutes usually * * * limit compensation to injuries that result in partial or total disability. * * * Radiation exposure is cumulative and manifestations may be long delayed * * * (thus) delaying earning power loss. * * * Sterility, shortness of life (effects of which would appear during the years of retirement) or genetic damage, none of which cause wage loss—should these be compensable as occupational injuries? * * * What should be done to compensate for receiving total permissible dose of radiation and then later needing extensive medical X-ray treatment or other exposure?

B. *Amount and Types of Awards for Compensable Injuries*

Radiation injuries * * * call for unique skills in treatment not readily available in most places. Question:

1. Are radiation injuries sufficiently unique to call for modification of cost limits in the standard medical aid provisions?

2. Should provision be made for availability of radiation specialists for all radiation injury cases? Should premanifestation treatment be required?

3. Are existing scales of benefits for accidental injuries fair as applied to radiation injuries?

4. Are radiation injuries sufficiently unique and the number of specialists sufficiently small to call for special federal action to handle radiation problems?

5. What should be done for workers, technicians and professionals, who have had all the exposure they can stand for their lifetimes without incurring serious injuries, and who therefore will be unable to make further use of their special skills?

6. Should vocational rehabilitation aimed at training these men in new skills of comparable value and prestige be one of the benefits of compensation awards for radiation injuries?

7. What should be done about personnel who, after they have received their total lifetime allowance of radioactivity, can find equally well-paid positions having no radiation hazard, but who lose very important seniority rights as a result of change in employment?

C. *"Notice of Injury" and "Filing" Requirements*

* * * Some statutes contain overall filing of claims limitations. * * * In some radiation injury situations all statutes will seemingly have too short periods of limitations to allow proper notices of injury and filing of claims by the injured worker. * * * If extended to unduly long periods, how can employers be protected against spurious claims, loss of evidence, etc.? Should routine examinations for possible evidence of radiation injury be required periodically as well as when the worker terminates his employment? Should some central filing scheme be set up? [4]

Two of the provisions almost universally recommended by students of the field are already a part of California's labor code—the inclusion among occupational diseases of those caused by radiation, with full coverage and unlimited medical benefits; [5] and a statute of limitations for filing claims which provides that the one-year time limit shall not begin to run until the date on which the employee has knowledge of the nature of his disability and its relation to his job, and until after disablement.[6]

However, the suggestion has been made that the possibility of long-continued disability eventually resulting in death, where both the disability and death must be compensated, may require extending existing limits on allowable periods of disability and limits on total liability in a single case.

Apportionment of Liability, the Problem of Proof, and the Keeping of Records. If a worker has been exposed in a number of plants, perhaps in a number of states, over a number of years, the administrative problems of apportioning liability become difficult indeed. To hold that the last employer permitting a worker to be exposed to radiation hazard shall be liable for his total compensation is likely to work injustice both

[4] American Bar Association, *Reports* (1957), pp. 321-327.
[5] California. Labor Code (1957). Sec. 3600 and Sec. 4600.
[6] California. Labor Code (1957). "Sec. 5405. The period within which may be commenced proceedings for the collection of benefits * * * (in disability cases) * * * is one year from (a) the date of injury * * * "Sec. 5412. The date of injury in cases of occupational diseases is that date upon which the employee first suffered disability therefrom and either knew, or in the exercise of reasonable diligence should have known that said disability was caused by his present or his prior employment."

to employer and to worker. The worker previously exposed would have difficulty in getting a job in atomic industry.

California's second-injury fund, supported by legislative appropriations, is intended to meet this kind of case. It provides compensation from the fund to the injured worker, covering disability resulting from the combined injuries; except that the last employer meets the costs of the last injury. But if proof of causal relationships in radiation diseases were required this solution would probably be impractical.

The University of Michigan Law School, a committee of the American Bar Association, and the Legislative Council of Massachusetts have under way studies of tort liability in relation to radiation cases, but their reports may be long in forthcoming. The liability study authorized by the Massachusetts General Assembly in July, 1956, for example, was reported by the Massachusetts co-ordinator of atomic development, in January, 1959, as having been sent back for further study.

Dietz and Harris, in their admirable discussion of atomic energy problems, suggest:

> The answer might lie in the regular use of monitoring devices to indicate the level of radiation, and the keeping of records of over-exposure for long periods of time. Of course, the accuracy of such records and their availability to the IAC (Industrial Accident Commission) at some conjectural time in the future must be assured. If this procedure were followed, liability might be apportioned among many employers, with the state perhaps making compensation for employers outside of the jurisdiction of the state or otherwise not responsible.
>
> (*Cf.* California Labor Code Sec. 5500.5 (b) providing similar compensation for silicosis resulting from underground metal mining operations.)
>
> The Insurance Commissioner of the state must approve the substance and form of compensation policies supplied employers. (California Insurance Code Sec. 11658) So long as liability is difficult to predict, the validity of provisions will be difficult to formulate. For example, there is at present no rate established in the Insurance Manual for radiation industrial workers. (California Workmen's Compensation Insurance Manual)[7]

E. Blythe Stason, in discussing this question, says:

> * * * problems of proof are going to be important to the defendants. The defendants are going to have to keep records—and I wish I could talk at some length about records. I think one of the interesting things about this business is the care and skill with which operators using or producing this kind of material (radioactive material) are going to keep records relative to over-exposure.[8]

California attorney Edmund Leonard, participant in a symposium on atomic energy and the law, held at the University of California in Berkeley in November, 1957, also pointed to this need.

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[7] H. A. Dietz and Albert W. Harris, Jr., "How Shall California Government Meet the Challenge of Atomic Energy?" *Hastings Law Journal* 8(2), March, 1957.

[8] Atomic Industrial Forum, Inc., *Proceedings of the Annual Conference*, Vol. I (1956), p. 36-38.

> * * * the recognition of possible long-delayed manifestation of harm will require preservation of records of all kinds in atomic industrial plants for a much greater period of time than in industry generally. This is especially true of employment records and records of insurance coverage.[9]

But the fact that occupational exposure to radiation is only a part of the exposure of many individuals, who may have medical X-rays, or radiations from some other humanly controllable sources, has led some thinkers to propose a national system of record-keeping so that there would be a complete history of the total record of exposure to X-rays and to all other gamma radiation for every individual.

This proposal was given strong impetus by the 1956 report of the Committee on Genetic Effects of Atomic Radiation;[10] and it has been repeated from time to time by members of Congress, by labor organizations, by writers in the field of atomic energy and by at least one radiological society.

Fred MacGowan, international representative of the boilermakers' union, presented the argument as follows:

> Implied in the (exposure) regulations is what has been referred to as a "bank concept," meaning, of course, (that) a worker * * * will be permitted a certain amount of radiation over a certain period of time. In addition to this, he may receive a "one-shot" radiation of a stipulated number of roentgens, and the whole is predicated upon the fact that permissive exposure to people employed in the field can be likened to a bank book.
>
> Now any bank concept implies that the account is very little good without a bank book for your record—the employee's record of his account. * * * Mr. Reuther has discussed the point of adequate records and the fact that people employed in the industry are likely to receive radiation from outside sources. We have recommended * * * that all radiation must be accounted for and must be credited to the record of each individual exposed. This would include X-rays, both diagnostic and therapeutic, environmental or background and employment exposure, even to the fitting of shoes by a fluoroscope.
>
> * * * We have roughed out a mechanical plan for the accounting of this. * * * It * * * involves the keeping of records by the employers engaged in nuclear industries, and employers—that is, those that I have talked to—are understandably reluctant to undertake the accountability and responsibility for recording the individual's personal radiation * * * which has occurred outside of the field of his employment. We feel, however, that it is necessary to be done this way.
>
> The individual will receive periodic reports from the employer in somewhat the same manner as taxes withheld are reported to him. Thus the employee and the employer have the same information and can utilize it to the proper protection of the employee.

[9] California. University, *Symposium on Atomic Energy and the Law* (Nov. 1957), p. 124.

[10] National Academy of Sciences. Committee on Genetic Effects of Atomic Radiation. *Report*, 1956.

> This appears, I might add, to be a negotiable setup, and properly included in the realm of collective bargaining. [11]

According to a report from the Atomic Industry Forum, however, material submitted to the special subcommittee on radiation of the Joint Committee on Atomic Energy by the International Commission of Radiological Protection and the International Commission on Radiological Units and Measurements, advises rejecting this proposal as without value.

> The task group's report appears to take the position that, so far as the individual is concerned, maintenance of his own record in his possession would be of little value, and might in fact be harmful.
>
> * * * (There is) a real possibility that patients might refuse an X-ray examination.
>
> * * * Other possibilities were suggested: (1) the maintenance of records on individuals by a central record-keeping agency such as the Bureau of the Census or the Bureau of Old Age and Survivors Insurance (social security) or (2) the maintenance of records of groups of the population without maintaining the identity of the individual in such records.
>
> * * * * *
>
> The task group observes that "equal funds expended in activities designed to reduce the radiation exposure of the population might well be of greater benefit than funds expended for recording the present status."
>
> * * * "information of essentially equal value could be obtained with substantially less expense and with probably greater accuracy on a sampling basis." [12]

The difficulties and costs of individual record-keeping to prove when, where and how a radiation disability originated has led others to propose that there be legislation establishing that a worker exposed to radiation in employment who suffers a radiation disability be presumed to have a job-connected disability.

This solution is the one which has been chosen by the Japanese government. At the 1955 Geneva conference, the Japanese chief of the office of scientific and technical administration, Prime Minister's Office, reported:

> We shall describe here the present situation of compensation for common workmen relating to injury caused by radiation, which has been in force for several years since the war. * * *
>
> * * * * *
>
> * * * Since the condition or disorder caused by harmful radiations is continuous and normally comes worse very gradually, it is very difficult to distinguish the disordered from the normal. Therefore, we had to determine the degree of disorder caused by harmful radiations by the following regulation.

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[11] AFL-CIO Conference on Atomic Radiation Hazards, *Extemporaneous Statement by Fred MacGowan* (February 28, 1957).

[12] Atomic Industrial Forum, Inc., *Atomic Industry Reporter*, No. 123 (October 9, 1957).

In a case where a worker, who is usually engaged in jobs in which he is likely to be exposed to harmful radiations emitted by radium X-ray tubes, or other ionizing radiations * * * suffers from radiation sickness, this shall be considered as the disease regulated in the fourth item of Article 35 of the Enforcement Ordinance in the following circumstances:

1. When there is any cancer, ulcer, etc. of the skin.
2. When the number of red corpuscles in 1 cm^3 of capillary blood becomes regularly less than 4 million in case of male, or less than 3.5 million in case of female.
3. When the number of white corpuscles in 1 cm^3 of capillary blood becomes regularly less than 4000.

The meaning of "regularly" in these cases is as follows: it indicates that blood has been taken from the damaged workman twice in two consecutive days without any difference being shown in the average blood corpuscle count.

* * * * *

* * * we have a system of Workmen Compensation Insurance, which is one of the most important social insurance systems in Japan. It lessens the burden on the employer and ensures compensation for the worker.

The employer pays a premium to the government every year and the government gives the benefit to the worker who has to be compensated.

* * * * *

Every employer who employs a certain number of workers in hazardous conditions has to enter the system, and the worker who has been engaged in hazardous work, even if he is now retired from that work, never loses the right to be compensated, if the necessity arises.

There is a small gap in this system. If the number of workers who are engaged in hazardous work is very small in proportion to the number of other workers in the same enterprise, the employer need not enter the insurance system. Thus X-ray technicians or doctors exposed to hazardous radiations in a big hospital may sometimes lose some of the advantages of insurance. * * *

The Workmen Compensation Insurance has been in force since 1948 and costs more than 10,000 million yen every year.[13]

A similar solution was proposed by Prof. Somers at the conference mentioned above. He said:

It seems to me that the atomic age calls for the provision of additional measures for the security of all workmen's compensation liability. This can be done by the establishment of a special fund to be managed by the state, and created primarily from a given proportion of premiums which will be contributed to the fund, to be used for meeting all verified [14] claims which might otherwise have no source of payment. This type of fund is not without precedent.

[13] United Nations. *"Proceedings of the International Conference on the Peaceful Uses of Atomic Energy"*. Vol. 13, p. 3-6 (1956).

[14] The definition of the term "verified" is obviously, however, one of the points in question.

There are now in many states, particularly in the Northwest, special funds set up to meet contingencies of various kinds which are financed by a tax on premiums and administered by the state. Also the Federal Government has been asked by the insurance industry itself to set up an emergency fund which will serve as an underwriting of third party liability which may occur in cases of atomic explosion which would go beyond the degree of limited liability which the industry feels itself able to assume. It is just as logical to underwrite the type of unmet liability which I have described. The overall costs would be very small but the payments would be crucial in the lives of those affected.[15]

The 1956 convention of the IAIABC (International Association of Industrial Accident Boards and Commissions) heard the AFL-CIO legislative representative make substantially the same proposal, together with a novel idea for automatic compensation for overexposure, at the time of the accident:

* * * let me note briefly at this time, by way of illustration, three noteworthy suggestions which have been made by different experts.

One suggestion arises out of the difficulties of measuring radiation effects or of linking a specific injury to a specific exposure. It may be desirable for this purpose to adopt a presumption provision on the causal relations between radiation disability and employment.

Such a provision would state that, if a worker is employed where radioactive substances are used, it shall be presumed, in the absence of substantial evidence to the contrary, that disability or death found attributable to the effects of radiation arose out of and in the course of his employment.

A second suggestion considers another aspect of the measurement problem and the delayed manifestation of injury. How do you apportion employer liability where the disabled worker may have been exposed in a number of different plants? It may be unfair to charge compensation against only the last employer and administratively impractical to divide responsibility among earlier employers.

Here it may be equitable to apply the second-injury-fund approach to reduce the cost assessed against the last employer.

The third suggestion is much broader and quite intriguing. Would it not be equitable to take into account the fact that radiation may harm a worker even though there is no immediate observable effect? Compensation might be provided *at the time of overexposure* in recognition of the premature aging, shortened life, delayed injury, or genetic damage which may be suffered as aftereffects.

Why not a uniform federal system to provide compensation for different dosages of radiation suffered in employment, regardless of whether or not any ill effects are immediately apparent?

These and other problems and approaches require careful study. * * * [16]

[15] California University, Institute of Industrial Relations, "Atomic Energy and Workmen's Compensation"; by Herman M. Somers (unpublished paper, May, 1957).

[16] U. S. Department of Labor. Bureau of Labor Standards, *Workmen's Compensation Problems.* (Bulletin 192: 1956), p. 172-73.

Is There Need for Federal Legislation on Workmen's Compensation? Compatibility between the policies and regulations of neighboring states, and even of states at some distance, is highly desirable. Many companies have branches in several states, and workers travel from state to state. Labor has taken the stand that federal legislation is necessary to accomplish adequate and uniform protection.

The fifth annual meeting of the International Association of Machinists' Atomic Energy Congress went on record for federal legislation on workmen's compensation.[17] The resolutions committee at the second constitutional convention of the AFL-CIO in 1957 took the position:

> The AFL-CIO is convinced that adequate workmen's compensation protection for all workers exposed to radiation hazards can be assured only through enactment of federal legislation in this field. Therefore, be it
>
> *Resolved:* * * *
>
> The Federal Government should enact legislation to provide uniform adequate workmen's compensation for injuries resulting from radiation exposure.[18]

And Walter Reuther, in opening the AFL-CIO Conference on Atomic Radiation Hazards mentioned several times above, presented some of the reasons for this stand at greater length.

> I believe we need to explore the whole question of whether or not this is a problem that requires federal legislation, or whether it can be handled by state legislation. * * *
>
> When I think of the problems that we already have because of the decentralization of industry and runaway shops, of how the textile industry deserts New England and moves into the South because of economic advantages that it is offered there, with all kinds of special provisions: supposing we had 48 state standards that affected the cost of production in atomic installations or the utilization of atomic materials in private industry? And on top of all the present economic incentives that states with the lowest labor standards, * * * the * * * lowest unemployment compensation, (and) workmen's compensation laws have— * * * should we look the other way with respect to enforcing standards related to atomic radiation exposure?
>
> * * * Does anyone really believe that the State of Mississippi is technically competent to draft and staff the enforcements of a state law to protect workers against the hazards of atomic radiation? * * * Even the highly industrialized advanced state, where social legislation has reflected a sense of responsibility and maturity, lacks the trained personnel in its safety standards divisions for dealing with this new problem, and people who are well versed and highly competent in the general field of industrial safety are not competent in this new field. * * * only the Federal Government has the trained personnel, and only the Federal Government has the leverage to enforce federal standards effectively because it

[17] Atomic Industrial Forum, Inc., *Atomic Industry Reporter,* No. 122, (October 2, 1957).

[18] AFL-CIO. Second Constitutional Convention. Resolutions Committee, *Report* No. 3 (1957) pp. 12-13.

controls the materials it issues the licensee, and these are the two leverages that must be used to bring about effective implementation of standards to protect the safety and the welfare of workers subjected to these radiation exposures.[19]

Seymour Brandwein, secretary of the AFL-CIO Staff Committee on Atomic Energy, forwarded the following telegram to the conference sponsored by the Atomic Industrial Forum, on the impact of the peaceful uses of atomic energy on state and local government, October, 1958:

> AFL-CIO supports continuation of federal responsibility for atomic health and safety of workers and public. * * *
>
> * * * On workmen's compensation, which is now a state responsibility, states have not acted to meet risks and so AFL-CIO seeks federal legislation as (the) only realistic means of assuring adequate compensation protection for all workers exposed to radiation hazards.[20]

It may not be the case that all unions support the stand for federal legislation as firmly as do those quoted here. A California representative of the IBEW, at any rate, expressed in conversation the belief that the IBEW does not "go as far as Reuther and Biemiller in opposing state regulation in favor of federal legislation." Then he added:

> But the two viewpoints are not really so far apart though, because all admit that states like California, Washington and Michigan might adopt standards even more adequate than would be embodied in federal legislation. When it comes to the southern states it's a different story and federal legislation may be needed for that reason.

On the other hand, the south, as represented by the Southern Regional Compact, has stated one of its aims to be "to establish the authority of the states over atomic energy in the fields of health, safety, and development," [21] and a spokesman for representatives of the group, which traveled to Washington to hold closed-door meetings with the Joint Committee on Atomic Energy and with the AEC, stated:

> One of the primary purposes of the trip to Washington * * * was to explain to Congress and the AEC the views of the Southern States regarding state activity in the atomic energy field. State officials feel * * * that as soon as possible atomic energy inspection activities should be delegated to the states by AEC. * * * One of the principal objectives of the council is to work for uniformity of radiological health and safety codes among the states. (It is hoped) that no state will adopt health and safety regulations which are more strict than those of the AEC.[22]

The National Industrial Council, Washington group representing 38 state manufacturers' associations, has set up an Atomic Energy Committee, whose chairman, Otto F. Christenson, presented management's

[19] AFL-CIO Conference on Atomic Radiation Hazards, *Remarks of Walter P. Reuther* (February 27, 1957), p. 4.
[20] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 62.
[21] *New York Times*, September 28, 1958.
[22] Atomic Industrial Forum, Inc., *Atomic Industry Reporter*, No. 112 July 24, 1957.

opposition to federal legislation in the field of workmen's compensation at the Atomic Industrial Conference of October, 1958, referred to above.

> In the 38 principal industrial states of our Nation there are state manufacturers' associations whose activities and objectives are to * * * advocate just and reasonable laws for the protection of industry and the general public.
> * * * these representatives of management represent them before the various departments, commissions and bureaus at the time policies are being established and the laws are recommended, or the rules or regulations are being considered. They may do this by being members of the committees—by appearing before the committees—by bringing witnesses before the committees—or by seeing that informed witnesses go before the committees. From the 1912-1920 era, down to the present, the state manufacturers' associations have been the spokesman for management in the field of workmen's compensation. This, of course, has tied them up closely with safety and insurance. In the workmen's compensation field, this extends to all phases, including interim study commissions, recommended legislation, dissemination of information relating to decisions and interpretations, and eventually in many cases, to representing the industry buyer of insurance as opposed to the insurance company seeking higher rates for some or all classifications.
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> * * * * *
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> Last year a technical subcommittee on workmen's compensation was changed into a Nuclear Energy Committee. The liaison representative to the N.A.M Nuclear Energy Committee from the state associations who also served as chairman of the Workmen's Compensation Committee, was made chairman of the new Nuclear Energy Committee. This committee has an advisory subcommittee—William A. McAdams, John Secton (of the Pennsylvania Manufacturers Association), William A. W. Krebs, Jr., and Otto Christenson. In general, the purpose of the committee and its subcommittees will be to develop information and make recommendations as to federal legislation, state legislation and activities of interested state and federal regulatory bodies.
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> * * * * *
>
> In the field of workmen's compensation, private industry and their associations and representatives should take the lead in recommending proper amendments so that workers injured by radiation should be protected and compensated for loss of wages. Most of our state laws are already adequate—with a few changes. The significant thing here is that in the nuclear energy field more than in any other industrial development, the care and caution of management itself has kept down injuries to a minimum.
>
> Of course, there is the matter of the statute of limitation. Everybody even slightly familiar with the law knows it is usually six months or a year in most states. Everybody will agree that in nuclear energy accidents the statute should be extended to protect workers upon the discovery of the condition, rather than setting any limited time. The question of establishing liability and cause

should be worked out, and will be worked out, by management people and insurance people.

There are other more difficult problems to meet than the statute of limitations. What do you do with the little girl who finds she is sterile five years after she has left radiation exposure, and has been married three years? She has suffered no loss of wages—but she does have an injury that is difficult to evaluate in dollars. What do you do about a 34-year-old Ph.D. who has a wife and three children—an annual income of $40,000—and who has been exposed to sufficient radiation so that he must go to another job at a great loss of salary—but who may live to be 90 in continued good health, if he does? These, and many other problems, should be approached forthrightly by management—on a state level at the beginning.

Labor union leaders have long sought federalization of workmen's compensation, just as they have sought federalization of unemployment compensation and most other laws affecting the public generally. With this philosophy most management does not agree. In this field of nuclear energy, those of us in management, and those of us in state governmental positions, should take an early position to have these matters of safety, health and workmen's compensation continue on a level of state and local supervision, inspection and compensation. There is no problem inherent in nuclear energy, or in any other form of energy, that states cannot adequately deal with, and in a manner that will stimulate the industry, and not stifle it. Close liaison among top management and their state manufacturers' association will permit a prompt and adequate job on their state levels.[23]

There is here a confrontation of opposing philosophies, so often revealed in discussions of states' rights issues. But in his remarks on the novel challenge presented by the young girl who may be sterile, or the young nuclear scientist who may be downgraded in earning capacity because he can no longer afford to work under exposure to radiation, management's representative seems not far from labor's in regarding the challenge as genuine and serious.

Provision Regarding Selection of Doctor. A long-standing controversy has flourished over what labor organizations term "restrictions on employee's choice of doctor." The issue was included in a discussion of basic principles underlying full protection of workers in atomic energy industry by Bruce A. Greene of the U. S. Bureau of Labor Standards, presented to the Geneva Conference. He pointed out:

> In most states, the law provides for the choice (of doctor) to be made directly by the employer or insurance carrier. In a few states, the selection is made by the worker from a panel made up by the employer or carrier. In about one-fourth of the states, the worker has some form of "free choice" but only a few of these authorize unlimited "free choice."
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> * * * * *
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> * * * one of the main points to control is that the injured worker is treated by a physician, surgeon, or specialist whose competence

[23] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January 1959), p. 62-64.

> to treat the type of injury sustained has been determined by recognized medical organizations.
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> * * * * *
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> Since relatively few doctors are experienced with and qualified to handle radiation diseases, it is important that the worker who is suffering from such disease has the opportunity to consult a specialist, whenever this is possible.[24]

Labor's interest is in getting access to medical care supervised by the Industrial Accident Commission, rather than by the employer or insurance carrier alone. This point appears frequently in the resolutions on workmen's compensation passed at labor conventions.

Summary. California's workmen's compensation legislation is among the best in the country. Questions arising for government from the circumstances surrounding radiation-caused diseases and injuries may be listed in summary.

1. Should legislation be passed establishing that a worker who has been exposed to radiation in employment, and who suffers a radiation disability, be presumed to have a job-connected disability?
2. Should the employer be required to keep individual exposure records for all workers exposed, or potentially exposed, to ionizing radiations? Should these records be freely available to the worker? Should record of medical exposures be included? [25]
3. Should the period of eligibility for healing benefits be extended, in the case of radiation-caused diseases?
4. To what extent should medical care of radiation injury cases be under the supervision of the Industrial Accident Commission?

Insurance for Nuclear Accidents or Injuries

The question of the availability of adequate insurance for atomic industry early engaged the attention of government, the insurance

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[24] United Nations. *Proceedings of the International Conference on the Peaceful Uses of Atomic Energy* (1956), pp. 60-61.

[25] In this connection the present policy of the AEC, contained in the AEC Manual, Chapter 0525 "Occupational radiation exposure information for AEC and AEC contractor employees" may be of interest.

051 Information entered in an employee's occupational radiation exposure record (exclusive of medical exposures) * * * shall be made available to him at his request. A reasonable period of time shall be allowed his employer for the preparation of such information.

052 Each employee for whom radiation exposure records are maintained shall be informed within 30 days after the close of the calendar year of his total recorded whole body radiation exposure dose from external penetrating radiation accumulated during the prior calendar year just ended, if the permissible yearly exposure as specified in AEC Manual Chapter 0524, *Permissible Levels of Radiation Exposure*, has been exceeded.

053 An employee shall be notified immediately of his recorded radiation exposure following the determination, by any technique acceptable to the Division of Biology and Medicine, that the employee has received a recorded accumulated radiation exposure exceeding any of the following limits specified in AEC Manual Chapter 0524:

a. In any calendar year quarter the quarterly permissible dose for external penetrating radiation to the whole body;
b. In any calendar year the yearly permissible dose for external penetrating radiation to the whole body;
c. A quantity of any radioisotope (whose effective half life is 180 days or greater) in the body estimated to be greater than the maximum permissile amount of radioisotope in the total body; or
d. A quantity of any radioisotope in the body resulting in a calculated dose in rads to any organ exceeding the yearly permissible dose for that organ.

054 Any employee terminating his employment shall at his request be provided with a written summary of his cumulative recorded occupational radiation exposure received during the period of his employment. (Effective: May 13, 1958.)

carriers, and industry. A study sponsored by the Atomic Industrial Forum and conducted by Columbia University focussed attention on the problems involved and organized a plan of attack.[26]

Dietz and Harris, in discussing the problem as it affects the State of California, said:

> While the State exercises exclusive broad regulatory powers over the insurance business (15 U. S. C. A. Sec. 1011-1015), the initiative for supplying insurance to the atomic energy industry has been exercised on a national level. An Insurance Study Group appointed by the Atomic Energy Commission reported its conclusions from a study of the insurance problems developing from peacetime atomic energy use. Initially, the group resolved that "the catastrophe potential, although remote, is more serious than anything now known in history." (AEC Press Release No. 662, July 13, 1955)[27]

The magnitude of the potential liability involved is indicated by the AEC in its Twenty-first Semiannual Report, as follows:

> In the large majority of theoretical reactor accidents considered, the total assumed losses would not exceed a few hundred million dollars.
>
> For the three types of assumed accidents, the theoretical estimates indicated that personal damage might range from a lower limit of none injured or killed to an upper limit, in the worst case of about 3,400 killed and about 43,000 injured.
>
> Theoretical property damages ranged from a lower limit of about $500,000 to an upper limit in the worst case of about $7 billion. This later figure is largely due to assumed contamination of land with fission products.
>
> Under adverse combinations of the conditions considered, it was estimated that people could be killed at distances up to 15 miles, and injured at distances of about 45 miles. Land contamination could extend for greater distances.[28]

By January, 1958, the AEC was able to report the passage of legislation by Congress authorizing the setting up of an indemnity fund to cover nuclear industry in the field of public liability.[29] In explaining the necessity for this legislation, the AEC report said:

> * * * The remote possibility that privately owned nuclear reactors might have a catastrophic accident created the problem that private organizations building or operating the facilities might incur a public liability larger than could be met either by the financial structure of their organization or by the resources of the insurance industry. * * *
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> To help clarify the problem, and the possibilities for its solution, the committee arranged early in 1955 for a group of insurance executives, representing the major associations of property and liability insurance underwriters, to study the prospects for providing insurance for private atomic energy activities. The committee

[26] Atomic Industrial Forum, Inc., *Financial Protection Against Radiation Hazards*, by Arthur W. Murphy. (January, 1957).
[27] Dietz and Harris, *op. cit.* pp. 132, 133.
[28] U. S. Atomic Energy Commission *Twenty-first Semiannual Report* (December 1956).
[29] Publ. L. no. 256, 85th Cong. 2d sess. (September 2, 1957).

generally has negotiated insurance programs for its contract work on a cost basis wherein the insurance companies assume no risk.

The insurance representatives concluded that workmen's compensation insurance could be provided by existing insurance facilities; that finances for property insurance for private atomic energy installations could be organized; but that, while public liability insurance could be provided in relatively large amounts the private capacity to underwrite this type of insurance might not be adequate to cover the claims which could arise in the event of a serious nuclear incident involving release of radioactive materials over large areas, even though the possibility of such an accident was vanishingly small.

The studies of insurance company executives lead to the formation in January, 1957, of three syndicates or pools to provide insurance for atomic energy activities. The liability policies would cover the facility licensee, all his suppliers of equipment and services, and others who might be held liable in event of a nuclear incident.

The commission believed that insurance coverage was adequate except in the public liability field. While the amount of liability insurance coverage was far greater than that provided for any other industry, it still was inadequate to cover the maximum possible liability which could result from a catastrophic nuclear incident, no matter how remote the probability of the incident. The commission therefore recommended to the Congress that, to enable private atomic energy industry development to proceed, the Government provide indemnification of companies engaged in certain activities.

After enactment of H. R. 7383 as Public Law 256, Eighty-fifth Congress, signed by the President on September 2, 1957, the commission promptly issued (September 11, 1957) a temporary regulation, effective until definitive regulations were issued (10 CFR 140, Financial Protection Requirements and Indemnity Agreements).

The provisions of the act are (a) that all facility licensees and, at the discretion of the commission certain materials licensees, are required to furnish proof of financial protection against public liability in an amount determined by the commission except "* * * that for facilities designed for producing substantial amounts of electricity and having a rated capacity of 100,000 kw or more, the amount of financial protection required shall be the maximum amount available from private sources"; (b) that such licensees and their suppliers of materials, equipment, and services and any others who may be liable are indemnified in the amount of $500 million over the financial protection required; and (c) that the public liability of all those liable is limited for each accident to the amount of financial protection plus the $500 million indemnity.

The temporary regulation requires each licensee authorized to operate a nuclear reactor to maintain financial protection in the amount of $150,000 per thousand kws of thermal capacity authorized by his license. This amount is established as a temporary

basis for determining financial protection required. * * * Such a relationship applied to all reactors needs to be expressed in thermal capacity since many reactors (e.g. research or testing reactors) will not be used in connection with the generation of electricity. * * * For the purpose of this regulation this ratio of thermal to electrical capacity) has been assumed as 4 heat (thermal) kw to 1 electric kw. Therefore, a capacity of 400,000 thermal kws would require $60 million of private insurance, or $150,000 per thermal kws of thermal capacity. The minimum amount of financial protection under this regulation is $250,000.

The committee is revising this formula and will issue later a permanent * * * regulation. (It) will attempt to take into account such additional factors as population density in fixing the amount of financial protection required for a facility.[30]

Dietz and Harris point out that although the amount of liability involved requires national action,

* * * ultimately the State Insurance Commissioner will need to involve himself in other aspects of the program. The form of policy, exclusions, rates, etc., are all within the jurisdiction of the state agency. (See California Insurance Code.) Similarily, the application of existing policies to atomic accidents must be considered. (For example, whether a nuclear reaction is a "fire" or an "explosion" within the meaning of those terms in fire and casualty insurance. See Kelly, *"Fire Insurance Problems in the Atomic Age," Insurance L. J.* 666, 1955). Safe reserves for operating companies and the validity of pooling arrangements must be taken into account. Consideration must be given to the adequacy of Workmen's Compensation Insurance in this new industry.

* * * Hospitals and universities are extensive users of radioactive materials and reactors in research today. The University of California has been particularly active in this respect. Probably there is little likelihood of a serious accident arising from these activities, but the possibility must still be considered. The tort liability of the University of California as a state instrumentality would depend upon the nature of the activities engaged in by it, that is, "governmental" or "proprietary." Perhaps public concern might be lessened by a clarification of the liability involved.

In California there is no immunity of charitable organizations, such as private universities and hospitals.[31]

In September, 1958, Congress, (taking account of the reluctance of educational institutions to participate in the AEC's research and training program using major facilities such as reactors, without exemption from the requirement that they purchase commercial insurance for nuclear risks) enacted legislation under which reactors operated by nonprofit educational institutions would be indemnified by the Federal Government, provided that they make their own provision for coverage up to $250,000. The school may determine what sort of protection, if

[30] U. S. Atomic Energy Commission. Twenty-third Semiannual Report (January, 1958), pp. 177, 178.
[31] Dietz and Harris, *op. cit.* p. 133.

any, it will provide for the $250,000, at which point governmental indemnification takes effect.[32]

As matters now stand, commercial firms can insure a single nuclear risk for over $65,000,000 with stock and mutual insurance pools. The pools have reinsurance agreements among themselves under which each risk would be shared in proportion to their relative capacities, with the Nuclear Energy Property Insurance Association assuming 84.8 percent of the risk and the Mutual Atomic Energy Reinsurance Pool assuming the remaining 15.2 percent.

Experience under the temporary AEC regulation now in effect is under intensive study looking toward the development of a more permanent regulation. In December, 1958, the AEC held a series of industry advisory conferences with California companies to discuss proposed regulations giving effect to the indemnity legislation. Companies invited to attend were: Pacific Gas and Electric, San Francisco; Aerojet-General, Azusa; American-Standard, Mountain View; North American Aviation, Los Angeles; General Atomic, San Diego; and General Electric, San Jose.

A number of states are studying the problems of interpretation of state responsibilities under the indemnity act. Kentucky has issued a set of "Radioactive Contamination Assumption Endorsements" which it has sent to all insurance companies and agents in the state. The bulletin setting forth the state rules may be obtained from the manager of the Kentucky Inspection Bureau upon request.[33]

Public Utility Regulation [34]

Whether electricity is generated by conventional means or by heat obtained from nuclear reactors, the broad regulatory powers of the California Public Utilities Commission are brought into operation. Significant features of control are: control over stock and security transactions of utilities; requirement that a certificate of public convenience and necessity be obtained for any new operation or change in existing operation; continual control over rates charged; control over accounting practices; promulgating rules for the safe intrastate transportation of radioactive materials, and for the safe operation of nuclear power plants. The director of the AEC's (then-named) Division of Civilian Application of Atomic Energy told the Governors' Conference in 1956:

> Your public utilities commissions will have to wrestle with important questions in the areas of corporate financing, financial responsibility and rate schedules for the power reactor companies.[35]

Krebs and Hamilton, in their discussion of the role of the states in atomic development, point out the following specific problems which will face state public utilities commissions:

> * * * a state public utilities commission may have to issue a certificate of convenience and necessity before the utility can devote

[32] *Nucleonics*, (September, 1958) p. 157.
[33] Kentucky Inspection Bureau, Louisville 2, Ky.; G. H. Parker, Manager. *Bulletin* October 27, 1958.
[34] Prof. Fred Morrissey of the Graduate School of Business Administration, and Prof. Richard Caves of the Department of Economics, University of California at Berkeley; and Mr. John J. Doran of the California Public Utilities Commission were kind enough to read this section and to make useful suggestions. None of them is in any way responsible for the content of the section, however.
[35] *Proceedings of the Governors' Conference* (1956) p. 153.

its funds to the construction of such a new facility. The state commission will have before it questions of considerable complexity and magnitude: Is it sound policy for the utility, at this time, to build into its generating system a facility of unknown reliability and clearly uneconomic in function rather than wait five or ten years for the uncertainties to be resolved? What will be the proper allocation of excess costs incurred in bringing atomic power into the system, as between investors and ratepayers, present and future? Are the consumers adequately protected against inadequate full-element supply? Can a utility participate in the construction and operation of a reactor located outside the State and therefore beyond the jurisdiction of the commission?[36]

An Ohio public utilities commissioner explained to the October 1958 Atomic Industrial Forum conference some of the new regulation problems stemming from the peacetime use of the atom:

Rate Determination

The regulatory problem of ratemaking for nuclear produced electric power is the determination and fixing of a fair return, as it is for conventionally produced power. A regulatory commission must first determine the valuation of the utilities' property to be used as the rate base. The procedure varies * * * but, generally reproduction cost, original cost, or fair market cost is determined and from this figure is deducted an appropriate amount to reflect depreciation. The difference represents the valuation or rate base. This figure multiplied by what is determined to be a fair rate of return results in the dollar return that is used for testing the reasonableness of the rates that the utility company desires to charge its customers for the utility service.

The principles which govern rate making with respect to nuclear produced power are essentially the same as those applied generally, i.e., the relative relationship of value and depreciation. With respect to depreciation three questions are presented:

(a) Amortization of excess costs in nuclear production over fair evaluation;

(b) Life period over which the total depreciation should run; (there is presently no mortality experience); and

(c) Possibility of rapid obsolescence. (This by way of new developments coming into the field with rapid frequency.)

However, until more experience from the operation of nuclear power plants is available it is difficult, if not impossible, to make specific recommendations as to the treatment of these items in the valuation. Any ratemaking problems that may arise in the foreseeable future can be solved by existing machinery employed in the ordinary regulatory process.

[36] William A. Krebs and Robert L. Hamilton, "Role of the States in Atomic Development" *21: Law and Contemporary Problems* (1956) pp. 184-185.

Accounting for Expenditures

Accounting for nuclear programs by the various utility companies is largely confined to the expenditures made in:

(a) Conducting research and development in the use of nuclear fuels in the generation of electric energy; and
(b) Participating with others through the medium of a nonprofit research and development corporation or some other form of joint effort.

To date most of the regulatory commissions recognize that extensive research and exploration in this field are in the best public interest and have consequently approved the charging-off of the excess cost over and above that normally required in the conventional power plant, as an operating expense. The cost of research and development has thus far been held to be a proper charge to operating expenses, Account 801, Miscellaneous General Expenses, in the Utility Uniform System of Accounts.

Naturally, a question arises as to when, in point of time, the research and development stage ends; subsequent excess costs must necessarily be reflected in the appropriate plant accounts. It has been suggested that one test for the time limit might be that point at which the use of nuclear fuel becomes reasonably comparable to the cost of producing steam by means of conventional fuels. Accordingly, normal accounting might then be associated with the start of engineering construction and operation for commercial use.

It is inevitable that research and development in this field must necessarily continue for some considerable future time. In connection with the accounting for expenditures, other matters such as depreciation and obsolescence, fuel costs, disposal of waste, cost of purifying cooling water, training and protection of operating personnel, local taxes on fuel elements, transportation and insurance present themselves and must be dealt with when the time arrives, either by adaptation to the existing uniform system of accounts or by amendment to the present system. No problem is likely to arise in this category that cannot be handled in the established orderly procedure of the existing regulatory process.

Intrastate Transportation

Transportation of radioactive materials can become extremely hazardous to the public. Many of the states do not have adequate regulation in this field, and in many others, existing regulatory measures do not adequately safeguard the public welfare.

The Interstate Commerce Commission has promulgated rules and regulations for the interstate movements of radioactive materials. And it has been suggested that the various states adopt the ICC regulations. For a state to adopt the safety regulations of the Interstate Commerce Commission as they are revised from to time, obviously would result in conflicts during the interim periods between intrastate and interstate requirements following changes by the ICC.

* * * most of the state regulatory commissions * * * have ample power to establish rules for the handling and transportation of hazardous and dangerous materials, and it is recommended that all states not having already done so, take the necessary steps to promulgate such rules and regulations. This problem appears to be one that can be met by the existing regulatory agencies in the normal regulatory process.

Nuclear Plant Safety

Most of the states presently have laws and regulations that protect workers from occupational hazards and accidents in their places of employment, and practically every state is studying the problem to make certain that the worker does have proper protection and indemnity. However, there still remains the broad question of applicability and enforcement of these statutes and regulations in a plant using nuclear energy.

At the present time, the Atomic Energy Commission, having a practical monopoly of the trained professional personnel to administer its health and safety regulations, must, of necessity, carry the greater portion of the enforcements activity. As state personnel gather additional knowledge and experience, more enforcement jurisdiction should be assumed by the states. The committee is of the opinion that existing regulatory machinery is capable of handling the regulatory responsibility of plant safety inside nuclear power plants when and as the occasion may arise.[37]

Some provocative questions were posed by the chairman of the Michigan Public Service Commission, speaking to the section of the American Bar Association on public utility law.

In my opinion, as Chairman of the Michigan Public Service Commission, the advent of the atom has not changed the fundamental principles of ratemaking. I do not claim that it may not at some time in the future, but, at least for the present and the proximate future, there appears to be no need for a change in fundamentals. My opinion * * * is premised upon the understanding that fissionable material will, if present research and development continues to prove successful, merely be used as a substitute for the fossil fuels in supplying heat energy at a basic cost not less favorable than present conventional fuel costs. *Therefore, the value* (as defined by law) *of utility plant devoted to public service will, in the absence of any statute to the contrary, continue to be an important basis for determination of a fair and reasonable rate of return.* However, I candidly admit that other problems are created.

* * * Under our Michigan Public Service Commission rules we have provided for the minimum construction standards in power plants, substations and the like, as a safety precaution. Similarly, when nuclear fuel is used, we must recognize our obligation to impose standards for the use of fissionable materials in the generation of heat energy which will produce steam to be used in the

[37] Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January, 1959), p. 26-28.

turbine-generator function. Responsibility of the same general character rests with the regulatory agency when the public avails itself of common carrier service within our state. Whether nuclear fuel eventually provides the motive power for common carriers or in some form is the commodity to be transported as a product of commerce, the same general obligation has been imposed on the Michigan Public Service Commission to make certain that the safety of the traveling public (used in its broadest sense) is protected. With the advent and use, transportation and storage of radioactive materials, our duty as a regulatory authority to adopt proper standards is now prescribed by statute. Under the provisions of the Atomic Energy Act, conflict with the power and authority of the Federal Government seems probable. * * *

* * * a serious factual question is presented in *the evaluation of what determines operating expenses in contrast with capital charges during the research and developmental period* which lies ahead for perhaps the next 10 years. Even though I may be accused of dogmatism, * * * I believe that just as long as true research and development occurs in establishing the technology and costs of operation of reactors and the transfer of heat energy, there is no question about those costs being truly operating expense. It is merely expending money for a new source of fuel, as a substitute for coal, gas or oil. When, however, the complete success of nuclear reactors has, together with its economics, been finally established; and the nuclear reactor assumes its eventual role of a conventional producer of thermal energy or motive power serving the public generally; and when it has been accepted by the public as well as the utility as a conventional and economic mechanism for such purposes, then, in my opinion, the transition period will have expired, and it passes from the pioneering or experimental stage to the utility plant account.

* * * it is entirely possible that at some time the regulatory agency may disagree with management and refuse to approve of continued research and development by a given utility, if upon competent evidence it concludes that such research and development bears no evidence of eventual success. In other words, the time may come when the regulatory agency is satisfied that in designing, constructing, and operating a reactor of a particular type further research is not only fruitless but also impracticable. In that event, the utility should not be permitted to reflect further expenditures in its capital or operation expense accounts.

Regulatory agencies will, I am certain, be confronted with numerous accounting questions. * * * I should like to treat first the initial charge for the fuel element used in a reactor. Should that be charged off as in the case of conventional fuels? The answer may well depend upon the type of reactor. It may also depend upon the agreement with the AEC which must, in the first instance, furnish this fuel element.

If the reactor produces more material than it consumes, and this byproduct is sold to the AEC or others, should the price received be used as an offset to the initial fuel cost, or should the proceeds be accounted for as nonutility revenue? The answers to

these questions, I believe, rest in the underlying agreement with the AEC. When the traffic in nuclear or fissionable material becomes free and established there may still be another answer. When these facts become a reality I can but suggest the application of sound accounting principles.

Similarly, when and if patents are granted to one or more utilities, and revenues follow, is it then to be treated as utility revenue? The answer to this question may well depend upon whether expenditures have been treated as a capital or operating charge. It becomes very apparent then, that until facts are established, there is no yardstick to offer.

Since accounting may be said to be primarily the recording of all revenues and expenses in strict accordance with a set of ground rules, it is inevitable that progress in the nuclear field will present questions which have not risen heretofore. Long ago, the federal agencies and the states (unless specifically prohibited by their statutes) adopted the Uniform System of Accounts. Most certainly, in those states wherein the first reactors (constructed solely by private capital) are placed in operation, there will first occur the necessity for determination of new precepts in the accounting bible, e.g., what about displacement of undepreciated plant? As this need for treatment of recorded costs of coal handling equipment, boilers, etc., presents itself, the accounts should be revised to accommodate new definitions and classes of plant. So also should the problem of early obsolescence of nuclear reactors be considered and the depreciation rate adjusted to reflect the best judgment of engineers and accountants. The many problems surrounding the use of nuclear fuel place upon each regulatory agency an obligation to initiate a continuous study of all factors which must be weighed no matter which type of reactor is used.

* * * I solicit the aid of the Bar in the adoption of a uniform code governing the use of nuclear fuels and in the establishment of uniform accounting treatment by the various regulatory agencies involved.[38]

As of September, 1958, eight public utilities commissions, including California's, had ruled that contributions by an electric company for research in the generation of electricity with nuclear energy are chargeable to Account 801, Miscellaneous General Expenses. They are: California, Illinois, Kansas, Michigan, New York, North Carolina, Wisconsin, and Washington, D.C.

Dr. Ray E. Untereiner, member of the California Public Utilities Commission, was chairman of a committee of the National Association of Railroad and Utilities Commissioners on Nuclear Energy in the Electric Industry, which issued a report in 1957 [39] setting forth the recommendations of this group on the various problems brought to the regulatory commission with the advent of nuclear power. The report favored the financing of research and development work by power

[38] Michigan Public Service Commission, "Atomic Energy from the Regulator's Point of View"; by John H. McCarthy (August 23, 1955) (mimeographed).

[39] National Association of Railroad and Utilities Commissioners, *Report of Committee on Nuclear Energy in the Electric Industry* (1957).

companies out of funds which would enter into the allowed expenses affecting the rates charged to consumers. The decision rendered by the California Public Utilities Commission, October 22, 1957, on this question in connection with PG&E's accounting request reasons as follows:

> Included in applicant's operating expenses are amounts charged to Account 801, Miscellaneous General Expense, covering the expenses associated with the development of nuclear power as a means of electric generation. The propriety of charging such amounts to operating expenses was not questioned in this proceeding nor is the commission raising any such question. To the contrary, the full support of the California Farm Bureau Federation is behind the applicant in nuclear power development and the commission finds the efforts of applicant, and the expenses of such development, to be in the public interest. Research and development, continuing studies on new and difficult reactor technologies, training of personnel, and construction of both pilot and succeeding permanent plants and associated activities will play an important role in enabling applicant to provide efficient and adequate electric service. The generation of electric power by the use of nuclear power may well provide the means by which future electric service will be of even greater benefit to this State than the modes of generation now employed. Applicant's costs here under review in this new field of endeavor are recognized to be fair and reasonable charges to its overall operations.[40]

Writers in the field of utility accounting have pointed out the difficulty the commissions will face of knowing when the nuclear power industry will have passed from the developmental phase which justifies this unusual treatment of accounts.

The NARUC committee report mentioned above, also approves of the same accounting treatment of any default, should it occur, in connection with the issuance of bonds to nuclear energy companies which are backed by the guarantee of electric and industrial companies.

In setting forth its recommendation in this regard it makes reference to the fact that early in 1957 the Securities and Exchange Commission decided that a nonprofit nuclear energy company to be operated for the benefit of a number of electric companies and some industrial companies should not be considered as an electric company for purposes of the 1935 Holding Company Act.

In 1956 a Senate subcommittee of the Committee on Interstate and Foreign Commerce held hearings to consider an amendment to the Public Utilities Holding Company Act which would have removed from the jurisdiction of the SEC: (1) atomic reactor companies which produce only the heat in connection with the generation of electricity; and (2) two or more public utility companies not at present subject to the holding company act, who sponsor and build, by means of a separate corporation jointly owned by them, a generating plant and related transmission facilities. As a consequence, the sponsors, though having a public utility subsidiary would escape regulation under the act. SEC at that time strongly opposed the amendment. The subsequent SEC rul-

[40] 55 Cal. P. U. C., Dec. 55720, p. 801 ff. (October 22, 1957).

ing appears to sharply change governmental policy of the SEC and FPC of recent years.

The NARUC report also favors rapid depreciation allowance for nuclear power companies. This policy was urged by several industrial representatives at joint committee hearings in the spring of 1958. The testimony of the president of Sylvania-Corning Nuclear Corp. may be taken as representative:

> I would propose that suitable legislation be enacted to permit electric utilities either singly or in combination, to receive rapid depreciation of no longer than five years on plants and facilities which AEC authorizes for participation in the program.
>
> Provision also should be made for any additional tax incentives which might be necessary to make up the difference to participating utilities between the cost of conventional power—approximately 8 mills per kwh—and the 15 mills sought to be attained by the (five-year) program.[41]

Taxation Policies

3. In February, 1957, the Maryland Court of Appeals upheld a ruling of the state tax commission that an individual cannot claim immunity from state taxes for income received under a contract of employment with AEC. The 1958 Maryland special session of the legislature passed a bill exempting from state and local taxation "tangible personal property in the form of machinery, tools and scientific apparatus including nuclear reactors, particle accelerators and radiation sources and associated equipment and special nuclear materials," but specifically refused such exemption to a nuclear reactor for the commercial production of electric power.

Two decisions of the U. S. Supreme Court in March 1958 allow state and local government to levy taxes on tools, equipment, and work in progress by private contractors and subcontractors but owned by the Federal Government—one, in the case of the City of Detroit v. the Murray Corporation of America, and the other in the case of the American Motors Corp. v. the City of Kenosha. As a result of the Supreme Court decision, at least three states in which AEC-owned plants are located have initiated action to obtain payment by the operating contractor of state and local taxes on federally-owned property. They are South Carolina against du Pont's operation at Aiken; Tennessee against Union Carbide Nuclear Company at Oak Ridge; and the City of Buffalo, New York against ACF Industries there. It is reported that legislation to override the Supreme Court has been drafted and will be submitted to Congress in the current session.

On October 24, 1958, the California Supreme Court by unanimous decision rejected a plea of Los Angeles County that personal property in the possession of defense plant contractors is subject to personal property taxation.[42] In the case of *General Dynamics Corporation* v. *County of Los Angeles,* the court held that no provision had been made by existing statutes for the taxation by local governments of possessory

[41] U. S. Congress. Joint Committee on Atomic Energy, hearings * * * *op. cit.* (February-March, 1958) p. 272. It is well established in law that where a utility takes increased risks to earnings a greater rate of return on investment is allowed in recognition of those risks.

[42] *General Dynamics Corp.* v. *County of Los Angeles.* 51 AC 59 (October 24, 1958).

interests in such property—this in spite of the March decisions of the U. S. Supreme Court in the Michigan and Wisconsin cases that the imposition of possessory interest taxes did not violate the principle of federal immunity from local taxation of federally-owned property.

The California decision has roused considerable resentment on the part of local governmental agencies which depend on such personal property taxes for the support of schools. An article in the *Newsletter* of the County Supervisors Association of California, points out:

> The California decision means that, statewide, local governmental agencies will suffer a $65 million loss in assessed valuation. A number of small school districts will lose more than 50 percent of their assessed value. If such exemptions are allowed to stand it ultimately means that other taxpayers must bear a greater load.
>
> Moreover, the immediate problem facing Los Angeles and other counties is the necessity of refunding several millions of dollars of impounded taxes. Los Angeles County must dig up $15.8 million; San Diego, $4.2 million, to name two. Yet in almost every instance the defense plants have been reimbursed by the Federal Government for the taxes paid, and therefore these refunds will go into the Federal Treasury.
>
> Both the State and the U. S. Supreme Court decisions opened the way for state legislative action which will enable the imposition of an enforceable tax against possessory interests in personal property. All local governments most certainly will rally in support of legislation in 1959 to remove the exemption.
>
> Nor will anyone be surprised when California's manufacturers trot out the old argument that defense plants should be exempt if they are to stay in business here. This contention is unfounded because it is Uncle Sam who ultimately pays the tax—not the defense industries. In 1957 the counties, cities and schools were eminently successful in beating off possessor interests exemptions for real property. A similarly united effort in 1959 would frustrate "free tax rides" by all who profit from government-owned personal property.[43]

Summary

Aside from possible adjustments needed in workmen's compensation law, summarized earlier, the states will need:

1. To consider adjusting state insurance codes to the federal indemnity legislation;
2. To consider the impact of the public utility commission's approval of accounting practices which pass on to the consumer the costs of research and development in nuclear power technologies; particularly if such costs are in any way already covered by federal subsidy;
3. If present practices seem justified, to consider how it should be determined when the developmental period has passed;
4. To study the effect on state and local financing of the recent California Supreme Court decision which ruled against the imposition of possessory interest taxes on personal property of defense plant contractors; and to consider the possible need for legislation to remove this present exemption.

[43] County Supervisors Association of California, *Newsletter* (December 24, 1958), p. 8.

This chapter will close with a picture of the pattern of financing and investment in nuclear energy industry as it has developed in the past five years.

INVESTMENT IN NUCLEAR ENERGY INDUSTRY

A survey made by the Atomic Industrial Forum in early 1955 showed that over 90 percent of the private industry investment in atomic energy occurred in companies with sales of over $100 million per year, and that the average percentage of research and development funds devoted to the atom was less than 5 percent of their total budget. An investment counselor, speaking at this early date about opportunities for investing in atomic industry, surveyed the field as follows:

> Until there is the beginning of a mass customer market, there will be little need for investment capital. When the mass-market appears on the horizon, new plants and facilities must be built, added working capital is needed, and an assessment must be made of the impact of these new atomic activities in terms of overall company activity and policy. This is the stage when "investing in atomic energy" becomes an important activity in its own right.
>
> Today this mass industrial market is still on the horizon for the majority of companies presently interesting themselves in atomic energy. In the case of isotopes and specialized atomic instruments we are certainly tooling up for the mass market, if the beginnings are not already here. Industry may sell a sizable number of research reactors in the near future, but more people think of atomic growth in terms of central station reactors and nuclear propulsion. In terms of the anticipated market for commercial power plants in the early sixties we can surely describe the present effort as "early beginnings."
>
> So far, American industry has shown a capacity to get into the atomic energy business without the aid of outside investment capital. This condition will undoubtedly change in the future, but it is difficult to project when this expansion time will come. * * * Pending such time, the investment counselor's role is largely one of "look see" and "tooling up" on its own nuclear education.
>
> All of us * * * sense the beginnings of a far greater industrial revolution than has ever occurred before in history.[44]

From the beginning of the AEC reactor development program, private industry has been encouraged by the Federal Government in ways which reduced the risk of the capital private companies were asked to invest. The *Congressional Digest* reported in January, 1957:

> While additional investment of private capital is being sought, the Federal Government can encourage the industry through initiation of new and expansion of existing direct and indirect financial inducements. Among these are certain tax advantages, financing of research and development, waivers of charges for special nuclear materials, placing orders for atomic products and services with commercial organizations rather than with government-owned facilities * * * the construction and operation of prototype reac-

[44] Robert LeBaron, "Investing in Industrial Atomic Energy," Atomic Industrial Forum, Inc., *Proceedings* (1955), p. 194-97.

tors anticipated to reveal the most effective and efficient reactor designs and other technical data which will ultimately result in lower costs and in establishment of more accurate criteria in determining and estimating costs.[45]

Late in October, 1957, a vice president of the First National Bank of New York told the Atomic Industrial Forum that as far as he knew, the reactor being built at Monroe, Mich., by the Power Reactor Development Co. (PRDC), was the only power reactor to date directly involving outside financing. A term loan of $15 million from pension funds was arranged with New York banks, with the utilities which owned PRDC guaranteeing both principal and interest. The bank official stated that direct guarantees of the borrowers would probably not be required when nuclear power generating costs became competitive.[46]

An analysis of the methods of financing atomic industry, presented to an Atomic Industrial Forum conference in late 1956, offered a clear and comprehensive picture of the situation as it then existed.

> Broadly speaking * * * the atomic field, as regards financing, can be divided into two categories. The first * * * includes the companies which have entered the atomic field by creating specialized divisions engaged in some particular phase of atomic energy, or they have integrated new atomic work in their present activities and organization. These new atomic activities, may for instance take the form of research and development effort, the costs of which are absorbed by these companies as an operating expense. This, although it may result in a reduction of current distributable income, should bring increased future earnings from the sales of new or better products. These new atomic activities may also call for the creation of new plants involving capital expenditures to conduct research or to manufacture a new product related to the field of atomic energy. New capital needed for such new manufacturing activities is generally financed as a part of the general expansion program of that particular company. Any outside financing needed in the form of bank loans, bonds, debentures or stock is supported by the general credit of that company. No special or specific problem of financing arises here. * * *
>
> (As an example.) Consolidated Edison is building a reactor plant entirely at its own expense. The nuclear plant which will be a part of the company's production facilities, forms part of the needs for capital of the company to cover costs of transmission lines, substations and the distribution network. The general credit of the company is used for securing this financing. In this instance, there is no separate problem connected with the financing of Consolidated Edison's new reactor plant. It is integrated in the overall construction program, of which the reactor is only a small part. * * * Such will also be the case of the homogeneous reactor plant to be built by Pennsylvania Power & Light.[47] Many industrial companies such as Westinghouse, G. E., Combustion Engineering, Babcock & Wilcox, North American Aviation, Glenn Martin, and so on are proceeding in similar fashion. * * *

[45] *Congressional Digest* 36: 11 (January, 1957).
[46] Data from a private market newsletter, October, 1957.
[47] This project has since been dropped.

The second category includes the many new companies which have come into being in the last few years and, more particularly, since the enactment of the Atomic Energy Act of 1954 * * * organized either as completely independent organizations or as companies owned or sponsored by one or several existing companies. These are concerned primarily with one or several specific manufacturing aspects in the field of atomic energy. Such companies, if it had not been for the discovery of nuclear fission, would never have come into being. * * * For these industries the financial problems have a special character. The necessary financing has to be met on the basis of the particular needs and capabilities of the company. Factors which come into play include the current market and the estimated future market for the new company's products. Another important consideration is the quality of management in the new company to meet the needs for capital and the form in which the capital is to be raised. The more or less rapid obsolescence of new industrial plants is also a factor to be considered in the financing.

* * * * *

* * * Without the * * * help and sponsorship of the AEC, the private industrial development of atomic energy could not have come into being. * * * The commission has adjusted its research program to expedite and assist in development work which is in the national interest and could not otherwise be performed. * * * It is as a result of this policy that we now have a private uranium mill industry. * * * In this case, purchase contracts for a given output at a given price were signed by the commission with the mills, thus permitting private investors to go into business with the assurance of a market for a substantial portion of this product for a definite number of years * * * approximately five years. * * * As a further step * * * the commission * * * requested proposals from qualified firms to process, also over a five-year period, uranium ore concentrates. * * * New companies probably will be created as subsidiaries of some large existing chemical companies for building and operating these feed material plants. For a number of reasons—one being the desire of the parent companies not to deplete their own cash reserves—these parent companies will probably take a rather limited equity position with respect to their new subsidiaries. These will, therefore, most certainly seek short-terms loans from lending institutions.

* * * * *

When it comes to the power-reactor field, we know that several utilities and industrial companies have pooled their resources and formed nonprofit corporations to construct and operate reactors. In two cases, part of the funds needed for the construction of the plant is covered through grants from the sponsoring companies. These are then written off as research expenditures over a five-year period. These grants are intended to cover the excess cost of a nuclear plant over the cost of a corresponding conventional plant of the same size.

The state public utilities regulatory commissions and income tax authorities have adopted a most constructive attitude by agreeing to consider this write-off over a five-year period before

> arriving at the fair rate of return to which the utility is entitled. That part of the cost is therefore supported in part by the utility consumer. The conventional cost, we might say, is then financed on the long-term basis normally used by electric utilities. These funds are secured from banks and insurance companies, although in some cases pension trust moneys have been used.
>
> Banks are instrumental in making available short-term money. Where long-term money is needed, whether or not it be in the form of equity and long-term loans—a function performed by the capital market—there are still many functions which banks can perform in helping to finance new industrial plants. For instance, the bank participation may take the form of a stand-by construction credit. Under such a * * * credit, the borrowing company may avail itself of a stipulated amount during the construction period. The borrowing company is permitted a stated time thereafter in which to demonstrate the anticipated earning which results from the new construction before the company seeks permanent financing. Construction financing is also based on the assumption that bonds and preferred and common stock may be sold more advantageously on demonstrated earnings rather than on estimated earnings.[48]

As far as the California scene is concerned, local banks and investment brokers are not actively competing to finance local companies. Of course, many California firms are branches of companies located elsewhere, so that the question of local financing does not arise.

Independent companies, most of them, have to go outside of their own resources for financing. If they can get a government order, they float stock. If they get orders in California, they are not under SEC supervision, but have to meet the state "Blue Sky Law." Companies—even such a big company as American-Standard—which have got into the reactor business without being AEC contractors are apt to have hard going financially.

Besides the big companies like G. E., which are self-financed, there are a number of local companies which have been financed out of personal investment—ARCO at Walnut Creek (at least at first), for example; Broadview Research and Development Co. of Burlingame; Francis Holden's Radiation Detection Co. at Palo Alto, and others. Service-type organizations, like waste disposal companies, are apt to be personally financed or else to have an "angel" in San Francisco or Los Angeles.

In conclusion, the prospectus of an investment company which specializes in atomic development companies may be analyzed for its value in revealing how, and under what auspices, even the small investor is now able to participate in nuclear energy development.[49]

The Atomic Development Mutual Fund, Inc., incorporated in Delaware in October, 1952, and first publicly offering shares in December, 1953, has among its directors William A. W. Krebs, currently Vice President of Arthur D. Little, Inc., Secretary of Nuclear Metals, Inc., member of Massachusetts Commission on Atomic Energy, Chairman,

[48] Atomic Industrial Forum, Inc., *Proceedings* (1956), p. 129-33.

[49] The prospectus prominently displays the required notice: "These securities have not been approved or disapproved by the Securities and Exchange Commission nor has the Commission passed upon the accuracy or adequacy of this prospectus. Any representation to the contrary is a criminal offense."

Committee on Legal Problems, of the Atomic Industrial Forum; and formerly general counsel of the National Science Foundation. Another is John R. Menke, President and Director of Nuclear Development Corp. of America, a director of Atomic Industrial Forum, member of the American Nuclear Society and formerly physicist at the Clinton Laboratories of AEC at Oak Ridge. Among its total of 13 directors, four were formerly associated with the AEC.

Investors may purchase the fund's shares under a periodic purchase plan which may be opened with an initial cash investment of no specified minimum amount, and with subsequent investments of as little as $25 each. Unless periodic investments are made at least once every seven months, however, accounts of less than 100 shares are terminated. Net asset value of each share on September 30, 1958, was $5.04, as compared with $4.61 on June 30, 1958, and dividends of five cents a share, payable August 11, 1958, and three cents a share, payable November 3, 1958, have been paid.

The number of shares outstanding at end of 1958 was 11,138,327, as compared with an end of year figure in 1957 of 9,269,226. Total assets on September 30, 1958, were $56,253,228—an all time high.

The dividend policy of the fund is to distribute substantially all its net income and any net realized capital gains each year and by so doing to relieve itself of the necessity of paying federal income taxes.

The authorized capitalization of the fund consists of a single class of 30 million shares of common stock at 33⅓ par value. All shares have full and equal voting rights with pro rata interest in the net assets of the fund. The fund is not authorized to issue any bonds, preferred stock, or other obligations prior to the common.

The portfolio of investments as of June 30, 1958, provides interesting evidence of what these experienced investors regard as balanced holdings in the present industry market. They are distributed as follows:

	percent
Uranium mining	29.7
Fuel processing	6.2
Special atomic metals	8.0
Radioactive materials and nuclear instrumentation	10.2
Atomic reactors, components and special equipment	14.9
AEC operating contractors	1.7
Application of atomic power (to submarines, ships, aircraft, or commercial electric power stations)	15.5
Diversified atomic activities (such as are represented by GE, Westinghouse, and similar companies)	10.3
Total stocks and industrial bonds	96.5
U. S. Government securities	2.3
Net cash and receivables	1.2
Total net assets	100.0

CHAPTER VIII

EDUCATION FOR THE NUCLEAR AGE

WHAT KIND OF PROFESSIONAL UNIVERSITY EDUCATION?

One consideration which helps determine the kind of university education required by the nuclear age is the answer given to the prior question: What types of research are needed for advancement in nuclear science?

In a talk delivered to a group of industry representatives in 1955, Dr. Ralph A. Morgen, research director of the Purdue Research Foundation, drew some enlightening distinctions between the kind of research which looks to the solution of some specific problem, usually with a set time limit for results, and the research which advances basic knowledge.

> It has just been said that industry is spending more money for research and development now than ever before in its history. Why should it spend additional money on research?
>
> This is a different kind of research that is being discussed. What is needed is research to find new laws of nature, which is done under conditions such that: (a) the ultimate use for which the research is done is unknown, immaterial, or at best a minor factor; and (b) that the time factor is not an important point. This is the kind of research which is done best in an academic atmosphere and which contributes toward the production of Ph.D. degrees.
>
> True, in many cases the problem may be the same or similar to one which is done in industry, but the motivation is different. When a particular problem is undertaken in an industrial laboratory, an ultimate use has already been promulgated. * * * The subject includes not only money but time as one of its parameters. As a result, in industry the specific job may be accomplished without getting all the basic information or by making approximations in favor of achieving the end. In most academic research the motivation is to find new information. In many instances new horizons appear as a result of the original work. When the ultimate objective is a specific aim or a specific time, it is not possible to digress and fully explore the new and unsuspected information which comes from the research.
>
> In addition to the research to find new laws of nature, there is needed a type * * * which will be called "foundation" research. The purpose of this type of research is to fill gaps of unknown physical and chemical properties, the specific need for which is not immediately apparent. For example, if the physical properties of butadiene had been better known, the building of synthetic

rubber plants during the war would have been much more easily accomplished. [1]

In fiscal 1957 the United States Government provided for $384 million for the support of scientific research in or connected with educational institutions, almost 70 percent of which came from the Department of Defense and the AEC. This has naturally raised the question whether too much of the country's best scientific capacity is being pressed into "practical" research to advance the war effort. Some thinkers believe this to be the case and instance the achievements of Russian scientists in space travel as a side-result of the heavy emphasis in Russian schools and laboratories upon "pure" physical research. Others minimize the problem, believing that since pressure to show results in terms of preconceived ends is self-defeating, such pressure is not usually put upon scientists working for industry or government. An American scientist worthy of his salt, this view has it, will accept assignments for "practical" research only if he is given the freedom to pursue fundamental questions if and when they arise in the course of his work.

> Any large project, even when its major goals are quite practical, if it is worthy of a place in a university, uncovers all sorts of fundamental scientific problems. It is proper, necessary, and entirely practical to lift such subproblems out of the main stream of a large project and set them aside for independent study. History is so rich with cases in which the ancillary results of research proved to be the ones of enduring importance that failure to pursue fundamental questions when they arise can only be viewed as maldirection of the work. * * *
>
> There is no obvious dividing line between projects which may be called appropriate or inappropriate to a university. This is implied by the prolonged failure of scholars to converge on a definition of "basic" research. Not only are there differences from one discipline to another in what is viewed as fundamental, but there is frequently no common opinion on the matter within one field. Broad, searching investigations seeking knowledge for its own sake and those striving to achieve "practical" describable ends have a way of meeting and crossing. The artificial satellites were launched by very practical techniques. Their orbiting motions are in accordance with mathematical descriptions formulated three centuries ago. They are revealing to us much that we had never known before about the region beyond our atmosphere. [2]

AEC Commissioner Dr. Willard F. Libby agrees as to the need for basic research in terms of practical results. He told the Eleventh National Conference on the Administration of Research in September, 1957, that government agencies, when forced to operate under pinched budgets should favor basic research, as experience has shown that this "gives a better return."

> The attainments of the laboratory scientists working for the sake of knowledge have been so great and so valuable in terms of the

[1] Atomic Industrial Forum, Inc., *Proceedings* (September, 1955), pp. 364-369.
[2] Lawrence H. O'Neill, in *Columbia University Forum* (Fall, 1958).

practical application that it is necessary only to study technical history to be convinced of the long term and general value of good quality basic research.

With respect to the atomic industry, projects usually fail where a requirement for basic research in conjunction with developmental efforts is not recognized. This has happened repeatedly. * * * [3]

Many more statements to this effect could be adduced, but if we take the point as established, what does it imply for the character of university education? A good grounding in the basic physical and life sciences, and a long preprofessional preparation rather than early specialization, is the recommendation both of professional educators and of industry representatives.

Even in the professional engineering field, specialization in nuclear engineering while in college is often frowned upon. The supervisor of advanced study in the educational department of Westinghouse Electric Co., speaking at the October, 1958, conference on the impact of peacetime uses of atomic energy on state and local government, said:

The engineer in beginning his professional career is faced with numerous specialized technical subjects not included in his college training. Immediately this is interpreted as an inadequacy in the college curriculum, and recommendations are made to revise the academic program. Many colleges and universities, reacting to these recommendations by former students, have introduced new courses of study in order to correct these apparent deficiencies. The results have been far from satisfactory and the trend is now back to a concentration on fundamentals, with the specialized training left to the employer.

* * * * *

* * * Westinghouse, with its many interests in atomic power, is hopeful that this new intriguing activity will not produce any drastic change in the present college curriculum. Concentration on fundamentals will produce the best engineers for careers in this field. * * *

University nuclear training programs are of two general types: (1) those which offer the degree in a traditional discipline with the inclusion of nuclear subject matter; and (2) those which offer a degree in nuclear engineering with the interchange of information from several academic departments. * * * A traditional program in which the new concepts are introduced is, at the moment, the better grounded program. However, there is, in the final analysis, no marked cleavage between the two approaches.[4]

Discussion at this conference showed general acceptance that specialty work in the colleges and universities should be on the graduate level with emphasis on the broad traditional disciplines in the undergraduate work.

[3] Atomic Industrial Forum, Inc., *Atomic Industry Reporter* No. 119 (September, 1957).
[4] Atomic Industrial Forum, Inc., *The Impact of the Peacetime Uses of Atomic Energy on State and Local Government* (January, 1959).

On a somewhat related question—whether there is need for a nuclear engineering license—conference speakers held that at the moment the need to become licensed in the nuclear field does not exist and individuals are not rushing to be so licensed. In the next 10 years, however, the need for a certified individual to supervise aspects of nuclear technology may be required.

Several governmental agencies and professional societies have begun, however, to take steps to develop qualifying procedures for nuclear professionals. The Bureau of Professional Licensing in Pennsylvania is now granting a professional engineering license in the field of nuclear engineering, and there were, at the end of 1958, three licensed nuclear engineers in that state. The Westinghouse representative quoted above said, in discussing this aspect of the question:

> The need for licensed nuclear engineers will occur with gradual frequency as states require experts on waste disposal, major industries require consultants to evaluate the potential of subcontractors, and as states put in tangible form state regulatory requirements. Two of the chief reasons why engineers engaged in the nuclear art are not rushing to the colors are:
>
> 1. The natural hesitancy to embark into the unknown. There is no history of published past examinations, and the engineer does not wish to accept the ignominious possibility of failure to meet the requirements in a written examination about which he may not have the faintest foreknowledge.
>
> 2. The frank feeling by major industry that nuclear engineering licensing is not yet necessary in the achievement of the present goals in the design, development, and testing areas. Rather, the concern of the major manufacturer is that the young engineer involved in such areas be judged by his thorough grasp of fundamental knowledge in his traditional discipline.
>
> The latter is by no means a rejection of the concept of licensing nuclear engineers. Rather, it is a matter of present-day emphasis.[5]

The American Standards Associations committe N-2, on general and administrative nuclear standards, has a subcommittee on qualifications of nuclear professionals. The facts are cited that the New York State Department of Health was authorized by the 1957 Legislature to set qualifications for "competent persons" in radiation protection work; that the American Sanitary Engineering Intersociety Board is now issuing certificates of "special knowledge in sanitary engineering in the field of radiation hygiene and hazard control," and that other groups are working to develop qualifying procedures for nuclear professionals. Some uniformity in licensing and certification practices is obviously desirable.

TECHNICAL EDUCATION AND TRAINING

As distinguished from university professional work in broad and basic areas, there is the kind of technical training and education which is given to professionals already on the job. Health department person-

[5] *Op. cit.*, p. 4, above.

nel, industrial safety inspectors, firemen, police, highway patrol, and management and workers in nuclear plants—all require some type of technical preparation for work relating to radiation sources and effects.

U. S. Public Health Service Training Courses

Since about 1946 the U. S. Public Health Service has had health projects in connection with AEC activities, and a project sponsored by USPHS and the AEC on developing training courses in radiation monitoring. On July 1, 1958, the Division of Radiological Health, within the USPHS, began operation with the office of the chief and four operating branches: the *program operations branch* which provides technical consultation, information and special services to assist states in developing and administering radiation control measures; the training branch which develops and administers a national training program for state and local health personnel; the *research branch* which is currently giving priority to long-term epidemiological studies, particularly where low-level radiation exposures are involved; and the *special projects branch* which co-ordinates responsibilities involved in the various interagency programs.

San Francisco is one of the two regions to which the USPHS has assigned a trained radiologist to help the state develop its radiological health program. It is understood that California is to recruit an individual or to train someone to take over when this officer is reassigned.

In addition to this the USPHS has inventoried the radiological health capabilities of 11 states. Fifteen division officers are enrolled full-time in advanced graduate study in radiobiology, radiochemistry, health physics and other disciplines in a number of universities throughout the country. These people will eventually be assigned to the states, or will go into the research branch.

There are also short-term intensive training courses being offered in about a dozen subjects at the Robert A. Taft Sanitary Engineering Center. These courses were completed in 1957 by 351 persons from state and local health departments, industry, government and elsewhere.

AEC Training Programs

Since 1957 the AEC has offered state personnel a course known as "Special Assistance in Training for Radiation Control." Earlier in this report it was mentioned that four California state employees, two from the public health and two from the industrial relations department, are taking advantage of this year-long AEC project, at the University of Michigan.

In addition, the AEC conducts instructor training seminars on the problems of radiation, for the benefit of such groups as municipal firemen and policemen. Several states have taken advantage of this opportunity. For example, under the auspices of the Kentucky division of nuclear information, 30 firemen, highway patrolmen, police officers and civil defense workers throughout the state attended a special radiological safety course at the University of Kentucky October 28-30, 1958. The course was given by a health and safety team of the AEC, offering classroom and practical instruction in the use of equipment for detection of radiation, methods for evaluating its potential danger and tech-

niques for combating it. In the press release on this event, the Kentucky nuclear energy co-ordinator said:

> With more than 60 federally licensed users of radioactive material in 13 Kentucky communities, it is important that firemen learn the latest recommended techniques for fighting a fire involving radioactivity with accompanying problems of downwind scatter; that highway patrolmen and city police be familiar with methods for handling a spill on the roadways; and civil defense workers expand their knowledge of equipment and radiation-reading procedures which might be applied in the event of a military situation involving radioactive fallout or the highly unlikely exposure of areas from civilian radiation sources.[6]

A small quantity of radioactive material was obtained from the AEC for use in the course so that the Geiger counters and other equipment would give an actual response assuring better training conditions. The training was so designed that those attending as students could use the knowledge they gained in training other members of their organizations. The teaching material used in the course was developed in co-operation with the New York state police laboratory, Troy, New York, with the assistance of state police instructors from 12 states and with the New York City police academy for instructors.

In co-operation with the Atomic Industrial Forum or other such agency, the AEC holds conferences designed to help educate management in the problems and technology of nuclear energy industry; issues technical publications; and offers a special eight-week training course, at Oak Ridge National Laboratory, in health physics fundamentals—a course which combines formal classroom work with applied health physics training, serving to prepare management personnel, among others, for their responsibilities in nuclear plants.

The education of workers employed in nuclear industry is being carried out chiefly by labor unions, as described in Chapter VI of this report.

Although a beginning has been made, it should be clear from the scanty catalogue given above that technical education and training for participation in nuclear industry, health protection, and state inspection has lagged greatly behind the need for such trained personnel.

GENERAL EDUCATION FOR LIFE IN THE NUCLEAR AGE

Before discussing the types of schooling and of popular education which are either being carried out or recognized as lacking, in the United States, something should be said of the urgent need for attention on the university and foundation level of social, economic and ethical problems produced by the release of nuclear energy. It is heartening to note that Columbia University has established a Faculty Council for Atomic Age Studies to make Columbia "a center for the study of problems facing society as a result of atomic development in the fields of physics, engineering, medicine, philosophy, law, journalism, business, and international relations."[7] New economic and adminis-

[6] Kentucky. Department of Economic Development. Division of Nuclear Information, *Press Release* (October 3, 1958).

[7] Atomic Industrial Forum, Inc., *Forum Memo* (February, 1957).

trative relations, for example, which have been emerging between government and the giant nuclear companies in the United States are surely deserving of careful study for their implications for social, economic and governmental theory.[8] The dehumanizing consequences of revolutionary technological changes which proceed far more rapidly than do man's institutional means of channeling and directing them call for creative thought and action on the part of men and women who are deeply concerned to protect and enhance the intrinsic values of human existence.

The professional group so far most active in the attempt to come to grips with some of the wider social problems requiring immediate attention are the academic and practicing lawyers. The University of California held a symposium on atomic energy and the law in November 1957; Texas and Illinois institutions have also taken leadership in the study of legal aspects of atomic energy industry; while the University of Michigan Law School, which had earlier held summer workshops on the subject, has announced plans for establishing an International Atomic Legal Center to provide world leadership in the field of Atomic Energy Law. The list of questions on workmen's compensation developed by the committee of the American Bar Association, and presented here in Chapter VII, illustrates the social awareness which is currently needed in many other areas as well.

California universities and colleges are in the forefront in research in nuclear science and technology, but there is little evidence that most academic workers are aware of what other academic workers in the state are doing; and, in particular, there is a virtual vacuum, here and elsewhere, in that territory which, by now, social scientists and humanists should have made into a busy marketplace of ideas.

Public School Education

The ferment of criticism and self-examination of the quality of education now attainable in our public schools is evidence that the implications for education of new scientific discoveries, new vocational opportunities, and new civic demands are not going unrecognized. The cry for more science in the curriculum; introduced at an earlier grade; by more competently trained teachers; working with updated texts and materials, has been raised from many quarters and there is little doubt but that due to the challenge some valuable rethinking and redesigning of American public education is under way. Important changes cannot be worked overnight, however, and there may be some danger that nonprofessionals, aware of only one facet of current educational need, may push educators into onesided solutions. Here as everywhere ingenious suggestions may come from the creative outsider, but for the long view and the balanced decision based on full consideration of consequences which do lie open to surface thinking, there is required careful professional thinking, social discussion, and experiment or pilot testing. The legislator can help in this field chiefly by making funds available for the type of educational programs requested by informed

[8] An example of the kind of study needed is provided by Elma M. Saletan's "Administrative Trustification," *Western Political Quarterly* (December 1958) XI:857-874; which examines the use of advisory groups by government and attempts to analyze, from the record, the extent to which industry groups have actually been used in the public interest.

representatives of the teaching profession after they have reached some broad agreement among themselves as to what is needed.

Meanwhile the AEC has (besides its extensive program of aid to colleges and universities in faculty training, fellowships and provision of laboratory equipment for instructional purposes) offered training courses in radiation biology for high school science teachers. In the summer of 1958 such courses were offered at 12 universities, supported by the AEC in co-operation with the National Science Foundation. The AEC provides funds for special equipment and operational costs, and the NSF provides stipends, family allowances, and travel costs to the high school teachers. Those who complete the course are given kits of equipment for use in performing experiments and demonstrations in radiation physics and biology in high school classes. About 400 high school science teachers have been trained in these summer institutes in the two years they have been offered.

AEC also opens its key laboratories and production facilities from time to time to provide lecture tours for selected high school students. More than 2,000 high school science students visited the University of California Radiation Laboratory, Berkeley, between September 1, 1957, and May 1, 1958, as part of the co-operative program conducted with northern California high school science classes; and similar programs went on in 10 other AEC facilities.[9]

Informal Educational Programs

AEC-sponsored Programs. The AEC has also taken the initiative in programs of popular education on the nature of nuclear energy and on peacetime uses of the atom. The July, 1958, semiannual report lists under "Information Activities":

> Six different types and sizes of displays, suitable for a large variety of exhibit arrangements and sites * * * now being circulated for the Commission by the American Museum of Atomic Energy, Oak Ridge Institute of Nuclear Studies.
>
> For display in large population centers, at state fairs, and at similar sites, there are three large 86-panel *Atoms for Peace* exhibits. Five mobile vans contain scaled-down, walk-through Atoms for Peace exhibits suitable for briefer showing in smaller communities. Six demonstrators travel with equipment enabling them to present *This Atomic World* demonstrations to high school assemblies. Ten new 18-panel units—*Summary of Atomic Energy* —packaged for shipment without an attendant, meet the needs of small cities and county fairs. Three 8-poster package exhibits titled *The Useful Atom* have been developed as library displays to increase reader interest in atomic energy. A booth exhibit explains the nuclear power program.
>
> The five walk-through exhibit vans maintain an intensive state-by-state, town-by-town schedule developed six months in advance of showings under the co-sponsorship of the National University Extension Association and the United States Junior Chamber of Commerce. The other exhibits are scheduled by the Oak Ridge

[9] U. S. Atomic Energy Commission "Twenty-fourth Semiannual Report" (July, 1958) p. 122.

museum on a first-come first-served basis, with some units already booked as far ahead as September, 1959 (p. 113).

* * * * *

During the first five months of (1958), 17,816 *kits of published material* dealing with various aspects of atomic energy were distributed to elementary, high school and college students in both this and other countries, as well as to teachers, adult study groups and other interested organizations. * * *

The kits are * * * on such subjects as the role of atomic energy in agriculture, medicine and industry; the food irradiation programs; the nuclear power program; basic research; uranium, prospecting; weapons development; how to construct a cyclotron; how to build a Geiger counter; radiation effects; the Atoms for Peace program; the controlled thermonuclear program; and careers in atomic energy.

During the same period there were 17,124 screenings of atomic energy *loan films* for a total audience of 743,646. * * * The 12 film libraries of the Commission contain some 70 titled unclassified subject films, available for loan upon request at 12 (libraries). Each library is responsible for servicing the areas nearest the library (pp. 121-122).[10]

State-sponsored Programs. In Chapter V of this study the unusual promotional activity of the southern states was mentioned. Florida and Kentucky, among the southern states, publish regular information bulletins; and Florida's Nuclear Development Commission, through the sociology department of Florida State University conducted an attitude and information survey among college students, on the statewide nuclear energy program, to serve as a pilot study for a similar poll of the state's population.

Other noteworthy projects were the newsmen's seminars held in some of the southern states, and the securing of a panel of editors of the leading southern newspapers to serve as a committee in developing a program of public education through news columns and featured articles on the subject of nuclear energy for peacetime use. Another original project was that, in Kentucky, of arranging to have an AEC speaker address a joint session of the state legislature on Kentucky's place in the atomic energy picture.

Ohio, too, has sponsored several public conferences on atomic energy, has a speakers' bureau for community club meetings, publishes a monthly information bulletin, and has helped in the preparation of a manual designed for instructing police in this field.

California's wealth of talent in the field of nuclear science and education should offer unique opportunities for public-private co-operation in the field of popular education. For example, the American Nuclear Society, which holds monthly meetings, has a northern and a southern branch in California with a membership of around 200 persons. The membership of such a society might well sponsor local and staff programs of public education.

The World Affairs Council of Northern California, which arranges programs of addresses and discussion on topics of current interest and public responsibility; and perhaps a dozen other such adult enterprises,

[10] *Op. cit.* pp. 113, 121-122.

might well be brought into programs directed toward various segments of the public.

The State might sponsor conferences for the general public, such as New York's and the New England States' on citizen participation in peacetime use of nuclear energy.

The State might co-operate financially in training programs for union apprentices and for vocational schools.

The development of a state film library for use by local groups; and state sponsorship of TV and radio programs in which knowledgeable persons on the local scene present information and discuss problems are also possibilities.

Nuclear energy is a dynamic subject deserving a dynamic program of public education.

Industrial Programs. A number of nuclear industries have taken initiative in inviting local public officials, community leaders, and selected school groups to tour their plants. Even more significant have been the efforts occasionally made by an industry to take the public into its confidence before locating in a community; to make sure in advance that local government and the citizenry understand the problems and benefits which might be brought to the community and to discover whether they wish, after knowing all the facts, to welcome the industry or to discourage it from locating there. Some of the promotional material prepared by the larger companies are of respectable educational worth, performing the double function of promotion and of public information. Private industrial engineers and nuclear scientists have sometimes responded to invitations to participate in science-teaching at the high school level.

While such public-spirited activities are to be praised, the responsibility traditionally and properly rests with the State for development of formal and informal programs of education to prepare the public to take an intelligent and policy-making part in community growth and direction. The design of education on such projects as are involved in controlling and developing nuclear energy should not be left to chance. There is a big task ahead for a statewide co-ordinator or co-ordinating agency in initiating professional work to this end.

Education of Public Officials

There is little to add to what has been said above, as to the means by which legislators, mayors, councilmen, county supervisors and others in government may gain the needed background to assume the leadership which is expected of them in this field. But the problem, where they are concerned, is of particular moment and difficulty, just because they are already responsible for so many different types of decision requiring some technical knowledge.

One of the educational tasks facing state co-ordinating personnel, perhaps working in a nationwide group to this end, is to develop concrete and time-saving ways of reaching the attention of public officials with the kind of basic information they need about nuclear energy; its potential for public danger and for public good; and the areas within which state or local government action is particularly needed.

CHAPTER IX

SOME GENERAL CRITERIA AND SPECIFIC PROPOSALS FOR STATE LEGISLATION IN THE FIELD OF NUCLEAR ENERGY

Two rather distinct governmental functions come into play in atomic energy legislation: the regulatory and the developmental (that is, promotional).

As *regulatory agency,* the state is concerned with

(1) Protection of public health and safety, further divided into
   (a) Worker protection, and
   (b) Community health protection; and
(2) Protection of economic welfare, further divided into
   (a) Labor protection (workmen's compensation)
   (b) Industry, worker, and public protection (adequate insurance available) and
   (c) Industry, public, and government welfare (utility regulation and taxation policy).

Typical *developmental interests* of the State in relation to nuclear energy industry reveal themselves in:

(1) The approval of zoning laws, tax incentives, depreciation allowances, and accounting practices favorable to atomic energy industry,
(2) Fostering programs of public education to allay unreasonable fears and to convince communities of the benefits of properly conducted atomic energy industry; and
(3) Giving state and local support to atomic energy research, training, and education to advance nuclear science and technology and to develop an adequate supply of trained personnel for industry and government.

Some states have concerned themselves with one of these broad functions to the neglect or virtual exclusion of the other.

CRITERIA FOR STATE NUCLEAR ENERGY LEGISLATION

Although it would be an exaggeration to say that there is consensus among informed students of the field on the characteristics of good atomic energy legislation, there is an impressive degree of agreement on a number of questions. This agreement may be indicated in a group of statements which, taken together, offer a rough checklist or yardstick against which to measure proposed state legislation on atomic

energy. The criteria of a good atomic energy bill at the state level, then, may be listed and explained as follows:

Criteria	*Interpretation*
It will be adapted to the governmental structure and practices, and to existing industrial and health conditions, of the particular state for which it is designed.	While the experience of other states will be studied, and "model bills" considered, the facts as to amount and types of industry in the state; and the actual strengths and weaknesses of existing departments of health, labor and industry, and economic development; will help determine the design of a bill tailored to the state's real needs.
It will clearly define the scope of responsibility, and the powers, of the persons, agency, or agencies which will administer it.	The bill should be studied by the personnel in agencies which would administer it, to avoid ambiguities of meaning and areas in which buck-passing or duplication between agencies might be encouraged.
It will give first priority to adequate protection of the health and welfare of the public, including those who work in nuclear industry plants.	The right wording of the goal of state legislation in this field is—"to protect workers and public while encouraging nuclear industry so far as is consistent with community health and safety."
It will create a favorable climate for nuclear industry in the state, so far as this is compatible with health and safety.	The bill will respect industry's need for workable, non-overlapping regulations; for a degree of permanence in agency-industry set-up; and for rules not so specific as to stop progress yet not so vague as to encourage evasion.
It will not attempt to legislate technical matters.	The rapid technical changes in this field make it advisable that rules or orders be not written into law which would be difficult to amend readily when changes are required.
It will leave traditional duties of rule-making and enforcement to existing agencies, while seeing that sufficient funds are provided to allow them to carry out their duties adequately.	Rule-making and enforcement are best carried out by agencies which have built up knowledge and experience in the several fields, and which can therefore offer consultative and advisory services to industries with problems, as well as inspect for abatement of hazards. But it will do no good to assign duties and responsibilities while withholding the financial support needed to implement the program.
It will provide for the services of a continuing committee of expert advisors to furnish competent guidance to the co-ordinating person, agency, or agencies.	Radiation protection requires several specialized skills, i.e.: ability to measure exposures, to use the instruments, and to interpret the techniques involved; to evaluate biological hazards when exposure to ionizing radiations is known; to recognize engineering design for safety; to evaluate hazards arising from disposal of radioactive waste as this might affect sewage systems, water supplies, air pollution, safety of highways over which such waste is transported, and preservation of fish, game, and other natural resources; to interpret the law (including insurance law) and to

Criteria (continued)	*Interpretation (continued)*
	evaluate legal problems to which regulations might give rise; and to institute programs of public education.
It will provide for the co-ordination of all the state's regulatory and promotional activities in the field of nuclear energy.	A system of rapid transmittal of information between the several agencies with interests in the field should be ensured; the submission of proposed regulations or amendments prior to their enactment to a co-ordinating person or committee should be required; a comprehensive list of such regulations should be maintained and published; and promotional efforts should be surveyed for overall consistency with regulatory activities.

CLASSIFICATION OF LEGISLATION PASSED OR PROPOSED

The legislation which has been passed or proposed by the several states falls within a few categories.

A. First, in those states which emphasize *radiation protection* as the chief new feature requiring the assignment of new functions to some governmental agency, these are usually assigned to the *department of public health;* or they may be divided between this department and the *department of labor and industry.*

B. Secondly, those states which emphasize *promotion and development* as the chief feature requiring new governmental activity, usually assign it to the *department of industrial development,* or of *commerce,* or to the *public service commission;* or to some person connected with one of these departments.

C. Thirdly, those states which emphasize the *co-ordination* of the interests and activities of the many governmental departments and agencies already active in nuclear energy regulation or development as the chief new governmental challenge, have solved the problem in several different ways:

1. A *co-ordinator* may be appointed within the governor's office, whose duties are primarily promotion and liaison. He is often assisted by an advisory board or committee of citizens, usually representing industry, labor, medicine, and some aspects of nuclear science or engineering. He is variously: (a) chairman, (b) ex officio member, and (c) secretary of this committtee.
2. A *co-ordinating commission* or committee, advisory to the governor, may be set up, *consisting of the heads or representatives of the several departments* with interests in this field.
3. A *co-ordinating commission* or committee may be set up, advisory to the governor, consisting of *lay citizens* with interest and competence in various fields related to nuclear energy. This commission may have power to employ an executive secretary, sometimes but not always drawn from some existing agency and giving part time to this new work.

4. A *commission of experts in radiological safety* may be set up, with power to employ an executive staff and to approve new regulations or amendments proposed by existing agencies; leaving the initiation of regulations, and enforcement, to existing agencies.

These arrangements permit of a variety of combinations—e.g., a co-ordinator and all three committees—lay advisory, expert advisory, and departmental head advisory—may be set up; or any combination of two of these.

These solutions may be compared with the specific recommendations of the California Governor's Advisory Committee on Peacetime Uses of Radiological Materials; and with the proposal of the University of California Committee on Radiological Safety, subcommittee on Radiological Safety Legislation.

Current California Proposals

From Governor's Advisory Committee. Alternate legislative proposals relating to atomic energy were submitted in recommendation from the Governor's Advisory Committee on Peacetime Uses of Radiological Materials.

1. One would create a 15-member governor-appointed Advisory Conference on Atomic Energy and Ionizing Radiation, representing industry, labor, medicine, science, education, law, local government, and state government. The Governor would appoint the chairman of this group, members of which would serve without pay but with necessary expenses reimbursed. They would meet at least twice a year.

Also created would be a State Committee on Atomic Energy and Ionizing Radiation, consisting of the heads of the several state departments and agencies with concern in the field. The chairman of this group too would be designated by the Governor. The committee would meet at least once every four months with duty to co-ordinate the programs of their respective departments; and might appoint technical consultants to advise them in relevant matters.

Registration of all radiation sources would be required, and would be with the Department of Public Health, with information obtained available to all official agencies.

2. In an alternate plan, the full-time position of Co-ordinator of Radiation Protection and Atomic Energy Development would be created in the office of the Governor, he and his staff to be known as the Office of Atomic Energy Development. Appointed by the Governor, his salary would be fixed by the Director of Finance.

Radiation sources would be registered with his office, and no regulation specifically applying to radiation may be adopted prior to transmittal to his office. He could appoint an advisory committee of technically qualified persons, without compensation, to assist in establishing the system of registration and types of sources to be registered.

Prior submission of regulations or amendments to regulations applying to radiation to his office would be required.

An unsalaried Advisory Conference on Atomic Energy and Ionizing Radiation, of the same size, composition, terms, and manner of appointment as in the first alternative would also be created, the Co-ordinator to serve as secretary.

Also created would be a State Committee on Atomic Energy and Ionizing Radiation, composed of department heads or representatives, as in the first plan. Thirty thousand dollars would be appropriated from the fund for the Fiscal Year 1959-60.

3. *Proposal of University Committee.* The recommendation of the University of California Subcommittee on Radiation Safety Legislation differs from both of the above plans, in that it urges the establishment of a Radiation Protection Agency, composed of a commission of experts and an executive staff, independent of any other agency. This commission would have the responsibility of recommending a program of radiation protection for the State; of preventing conflicting or unduly restrictive regulations of the use of ionizing radiation; of evaluating within reasonable limits the continuing exposure of the people of the State; of establishing what amounts of exposure would be deemed a hazard; of recommending abatement of hazardous exposure conditions; of discharging these responsibilities wherever possible through existing state departments; and of doing this in the most economical way possible.

Regulations relating to use of ionizing radiation would emanate from the departments according to their fields of responsibility, but would be submitted to or evolved in consultation with the agency before adoption; and enforcement of issued regulations and the abatement of hazardous conditions would be the responsibility of the department issuing the regulations.

The executive staff of the agency would work with other state agencies to avoid unnecessary duplications of regulations, programs, instruments, and personnel; would maintain the registry of radiation sources as designated by the commission; would gather and centralize a continuing estimate of the exposure of the people to ionizing radiation; would assist state agencies with technically skilled personnel and equipment; would maintain radiological laboratory facilities and instruments to provide these services as required for other state departments; and would supply training and educational services to other state agencies.

In support of this recommendation, the university committee points out that no single existing department or staff could discharge the responsibilities of the proposed agency in such disparate, yet required, fields as radiation protection in medical use; industrial use and occupational health; sanitation; waste disposal, including water and air pollution; agriculture; microbiology; animal husbandry; fish and game; educational and research use; AEC laboratory activities; oceanography; and transportation.

THE RECOMMENDATIONS OF CO-ORDINATORS IN OTHER STATES

At the October, 1958, conference on the impact of peacetime uses of atomic energy on state and local government, five state co-ordinators presented their views on their jobs. Excerpts from their remarks are paraphrased here to encourage concrete thinking on the part of California legislators undertaking to design a bill for this State.

Connecticut

An unpaid co-ordinator, appointed by and advisory to the governor, provides liaison between the various state agencies which regulate on atomic energy matters; between state and AEC; and, in particular, works closely with the department of industrial development.

Areas to which state activities should be promptly directed through proper existing authorities are:

Health and safety,
Workmen's compensation,
Insurance problems,
Tort claim liability and other legal problems,
Needed revisions or additions to state statutes and regulations,
Encouragement of development of nuclear energy in state,
Advancement of nuclear education—to assure availability of trained men and women in the field, and to educate the general public both as to benefits to be achieved and to dangers and lack of dangers in using this new tool.

Kentucky

The nuclear program is an integrated part of the department of economic development.

A 15-man advisory commission is also set up.

The co-ordinator tries to determine with reasonable accuracy the needs of his state in promoting atomic energy development, including the safeguarding of public and worker health without which a desirable industrial climate will not obtain; and to represent the state with AEC and with other states.

Subcommittees of the advisory commission initiate studies in
Workmen's compensation,
Public Health,
Waste disposal,
Insurance,
Education,
Tort claim liability, and
Adequacy of inspection and enforcement in regulatory agencies.

Massachusetts

The co-ordinator, who serves also as deputy commissioner of commerce carries chief administrative duties. A seven-member commission, composed of representatives of labor, industry, and education, serves directly under the Executive Department

Chief responsibilities of commission are

1. Developmental:
   To co-ordinate development and regulatory activities of state relating to industrial and commercial uses of atomic energy;
   To represent state in relations with other state, regional groups or the AEC;
   To stimulate and encourage atomic energy research and development in the state, to co-ordinate studies, recommendations, and proposals of several departments of state and its subdivisions; and

To keep governor, governor's council, and interested state agencies informed as to public and private activities affecting atomic energy development.

2. Regulatory—none.

But regulations or amendments to regulations concerned with atomic energy must be filed with co-ordinator 30 days prior to effective date. These can be passed over his recommendation, however.

Breakdown of duties into those relating to federal, state, and local areas is as follows:

Federal

Maintain close working relationship with AEC—

See that its publicity releases and the reports of the JCAEC reach state agencies;

Ask for faster notice by AEC to co-ordinator of licenses granted within the state, of AEC activities planned or going on in the state;

Ask for holding of hearings on applications for licenses in state rather than in Washington, D. C.; and

Request setting up one state contact point in the administrative structure of AEC, at Washington, adequately staffed, to which states can address requests for information and assistance, and which has the duty of keeping states informed.

State

Chiefly information, promotion, education—

Sets up co-ordinating committee of representatives of some 18 state agencies which have interests or regulatory powers concerned;

Helps see that such agencies are adequately financed to cover their responsibilities and train their staffs;

Helps define clearly areas of responsibility where emergencies may be expected: e.g., if accident occurs in a plant, or in the transportation of radioactive materials, are all the departments and divisions aware of what their area of responsibility would be and have they worked out a plan of action? and

Keeps state legislature informed, follows proposed state legislation.

Local

Sees that local fire, police, and public health authorities are notified of atomic energy licenses within their areas, and what they should be prepared to do about them (this should be *promptly* done); and

Sees that local agencies take advantage of courses for training and education of fire and police offered by AEC with co-operation of industry and state agencies.

Ohio

A full-time co-ordinator, with trained atomic energy engineer as part of his staff, is established within the governor's office. He is an ex officio member of the governor's cabinet.

An Atomic Energy Advisory Board of qualified lay people is also set up, of which the co-ordinator is full member.

Duties of co-ordinator:

Two major goals—

To do as much as possible to encourage the peacetime development of nuclear energy for the benefit of the public, and

To do everything essential to guard against potential hazards.

Co-ordinator must work through various state and local governmental agencies, give assistance and guidance to them in preparing themselves to cope with hazards, and in interpreting atomic energy industry to the local people.

Examples—locate all users in the state;

Distribute this information to proper state agencies which in turn distribute to local agencies with which they work every day;

Make arrangements with AEC for training of local fire personnel in radiological fire fighting;

See that highway patrol assigns a top officer as liaison with co-ordinator's office;

Prepare and distribute a special manual for policemen about nuclear activity and their part in it;

Publish an informational bulletin designed for department heads, other divisions, and interested outside local organizations;

Have department of insurance assign a liaison man with co-ordinator's office to start adjusting Ohio codes with federal indemnification procedures and to study other insurance problems;

Instigate staff training courses and try to get state help for increased cost for providing trained personnel; and

Compile a list of radiation-trained physicians and where local authorities can locate them.

The co-ordinator should establish close relations with AEC operations office in the area and co-ordinate plans for monitoring in event of a major accident, and other emergency planning, co-ordinated with local teams;

See that state official accompanies AEC licensing inspection teams, to observe methods and procedures, record them, and bring them to the attention of the proper state agency; and

Urge the AEC's Committee of State Officials to be more active.

Tennessee

Part-time co-ordinator, advisory to governor, has as his chief duty communication:

1st: With AEC, aiming toward state assumption of complete inspection responsibilities in the health and safety field, working with AEC to accomplish this as soon as possible;

2d: With advisory committee of 7-10 citizens representing a cross section of Tennessee's population, which

is authorized to retain staff and full or part-time consultant help as needed.

is instructed to use existing state agencies as far as possible, and which

should be selected so that each member represents a separate area of interest and can pass along formal and informal suggestions to appropriate state agencies;

3d: With local fire-fighting, police, patrol, public health personnel to see that they take advantage of training programs for personnel;

4th: With general public

through making AEC rent-free films available to public school teachers, and

through informing managers of various county and area fairs of the availability of atomic exhibits.

The advisory committee has asked Vanderbilt University, in the role of contractor, to make a study and report on the state's laws, compiling lists of atomic functions of each agency which should be ready to cope with atomic energy; to include the laws governing the operations of these agencies. From this, the advisor and Atomic Energy Advisory Committee will prepare specific recommendations on types of legislation, on specific amendments required to give state agencies the authority to do obviously needed jobs.

In future, states should enter the area of licensing radiation use, requiring a co-operative effort with AEC for a time to permit a gradual transfer of such authority from AEC for all its regulatory functions.

A representative from the Texas Committee on Atomic Energy urged that all state co-ordinators try to get other states to appoint a co-ordinator. They were advised to communicate with the American Medical Association and state medical associations; with the American Bar Association and state bar associations; and with other professional and trade organizations, in order to let them know of the co-ordinator's work and to urge them not to work against the co-ordinator-type of solution.

New York

Although New York State has not yet passed a comprehensive statewide bill, the chairman of its advisory committee presented his committee's favored proposal at the October conference.

The bill proposes:

Creation of a 15-member commission with power and duty to appoint a co-ordinator, full-time—a man of experience and ability in this field—in whom responsibility and authority would be concentrated.

Their duties:

To request continuing studies by administrative departments of state;

To co-ordinate such studies, recommendations, proposals, and activities;

To have privilege of receiving prior notice of issuance of any rule or regulation by any state department or any political subdivision of state, except in emergency; and

To keep governor, legislature, and other state departments advised of both private and public activities affecting atomic energy.

Creation of a 10-member temporary technical advisory board, chairman of state commission to act ex officio.

Their duties:

To study policies and activities of the commission;

To make recommendations thereon to the commission;

To transmit to the commission such technical advice as might be requested concerning the protection of labor and community, growth and development of atomic energy industry; and

Enforcement.

DISCUSSION AND PROPOSALS FROM CURRENT LITERATURE IN THE FIELD

Five articles presenting analyses and recommendations are selected from the growing literature in this field for summary here.

Dietz and Harris, occasionally referred to throughout this study, favor on the whole legislation resembling the New England model act.[1] George T. Frampton of Illinois sees limitations in the model act and favors national pre-emption of radiation control standards, into which state policies would be geared through a central state agency.[2] D. W. Parker of Colorado favors on the whole a new centralized agency for radiation protection within the larger framework of the model act.[3] Krebs and Hamilton of New England outline three possible courses which states may follow, one of which they favor—that of adopting laws and regulations where an area is not regulated by the AEC, and developing AEC's program of inspection and enforcement, with federal financial assistance for state participation in the program.[4] The Institute of Public Affairs of the State University of Iowa, while not favoring any one proposal, outlines the chief difficulties with the use of existing agencies for co-ordinating work, suggesting that centralization of at least the rule-making function may be needed in states where there is a great deal of nuclear industry.[5]

Dietz and Harris propose:

Consideration of authorization by the Legislature of a new position on the staff of the Governor of a co-ordinator of atomic development activities, such person to be appointed by the Governor,

[1] H. A. Dietz and Albert W. Harris, Jr., "How Shall California Government Meet the Challenge of Atomic Energy?" *Hastings Law Journal* 8, March, 1957.

[2] George T. Frampton, "Radiation Control—the Need for a National Policy," *Stanford Law Review* 10, December, 1957.

[3] D. W. Parker, "The Need for State Atomic Energy Programs in the West," *Rocky Mountain Law Review* 29, April, 1957.

[4] William A. W. Krebs and Robert L. Hamilton, "Role of the States in Atomic Development," *Law and Contemporary Problems* 21: 182, 1956.

[5] Iowa. State University. Institute of Public Affairs, *State Control and Administration of Atomic Radiation* (1957).

paid an adequate salary and provided with a budget and staff to accomplish his task; the co-ordinator to be directly responsible to the Governor and to act as the depository and conduit for the flow of information, and correlation of all proposed statutory provisions, rules and regulations and ideas for the development and control of atomic activities. Among other things he should also be responsible for disseminating this material, recommending legislation, co-ordinating state and local activities with the AEC, and maintaining a registry of all radiation sources for information purposes only. His exact duties, authority and control over action on atomic activities to be determined by the Legislature.

Consideration of a means whereby rules and regulations now proposed or about to be enacted by agencies will be correlated at the present time.

Study the feasibility of establishing an advisory council, under the Governor, generally similar in operation to the present statutory Governor's council with deletions of certain members and the addition of others, such as from the Public Utilities Commission, State Water Pollution Control Board and the Attorney General. This council to receive full information from the co-ordinator, to evaluate it and to advise him on all matters. The amount of control and authority of the council to be determined as part of an all-over plan by the Legislature.

Consider authorization, with necessary funds available for its operation, of a combined official and citizens' committee composed of cross sections of the population and industry, labor, medicine, educators, science and state to broadly study and report on the field.

Consider a study of local problems in this field, possibly through the League of California Cities and the County Board of Supervisors Association with the assistance of the Council of State Governments.

Memorialize the Congress, and urge the State's representatives in Congress, to clarify the Atomic Energy Act of 1954 to bring about as clear a specification as possible of the areas where total pre-emption on the part of the Federal Government is necessary and intended as well as to indicate where state action is possible.

Make a careful examination of the New England Plan, looking toward its possible adoption with modification.

Frampton believes that

The need for centralized control of leadership in radiation protection makes it necessary for the Federal Government to retain its role in this field.

In his plan, the states would play a vital educational, inspection, and enforcement role, but in co-operation with a central Federal Government agency, preferably the AEC.

On the part of each state, the vesting of responsibility for co-ordinating atomic energy, technical training, inspection, and enforcement procedures in a central agency (as recommended by the NCRP) is important; so that the Federal Government may co-ordinate and work with a single set of state officials in each state.

Crucial to the effectiveness of the control is the expressly conferred power of the federal agency, acting in the field pre-empted by Congress, to define the details of the working relationship between the AEC and the states. In no event, however, should any power be left to the states to determine maximum radiation exposure levels. Only by pre-empting this power can Congress begin to provide the needed national policy.

A co-ordinator under the model act would have no actual power to train or supervise inspectors, make any rules, or prevent existing departments from issuing their own rules. Experience in the New England states has shown that in setting up a state co-ordinator without legal power and a staff, the model act is likely to get a co-ordinator without influence and without salary.

D. H. Parker recommends that

If a co-ordinator is appointed in the governor's office, he should devote full-time to the building and co-ordinating of an overall atomic energy program, and give considerable attention to promotional and public information activities. The author is opposed to having the co-ordinator be the executive director of one of the major state departments, since direction of the atomic energy program would then be likely to be secondary. The co-ordinator should be adequately paid, given adequate quarters and clerical assistance, and should attend national and regional meetings on regulating peacetime atomic development.

Radiation protection problems should be given immediate attention, but should not be confused with or take the place of an overall program that involves much more. Studies should be undertaken concerning the feasibility of a complete legislative overhaul that centralizes and integrates authority over radiation protection.

The NCRP proposal for a centralized state agency is strictly limited to the matter of radiation protection. It would collect the fragments of authority pertaining to all aspects of radiation protection now scattered among existing agencies and centralize them in an entirely new agency with vast, exclusive jurisdiction.

Is there any program that would prevent having this limited island of centralization within the larger framework of the model act, with the existing-agency-approach to all other aspects of atomic energy? Such centralization need not disturb the authority of the existing state departments with respect to atomic energy matters in the areas of workmen's compensation, insurance, public utility regulation,public education, agricultural research and experimentation, and so on.

The leadership of state health departments, in whom the bulk of authority over radiation protection is vested in most states, can do much to ameliorate the problems stemming from lack of centralization by adopting comprehensive regulations patterned after those of the NCRP and the holding of co-operative study conferences with other agencies. The advantage of centralization, however, is the efficiency and uniformity of inspection, registration, policing, and enforcement that it permits. The author's views as to the seriousness of radiation hazards prompts him to endorse a legal

structure rather closely patterned after the NCRP act as the best approach to the problem.

Krebs and Hamilton favor retaining the AEC's authority over radiation control standards, inspection, and enforcement, with state officials gradually taking over as *agents* of the Federal Government, with due compensation. In the single field of reactor inspection, they favor no delegation of authority to the states.

> The success of any scheme will turn in large measure upon the caliber of the person selected for the position of co-ordinator and the financial resources put at his disposal.
>
> Probably his chief job will be one of "public relations"—initiative, imagination, and diplomacy—together with a great deal of assembling and disseminating of information. There is danger that the potential benefits to be achieved throught the co-ordinator will be lost if the person selected is already loaded with business or governmental responsibilities and if he is given neither office, staff, nor salary commensurate with his position. (So far, the New England states have not provided substantial financial support for their atomic energy programs.) Constant vigilance combined with flexibility of approach in a shifting, developing industrial field requires the full-time services of high-caliber personnel—not a paper assignment of responsibilities to a figurehead.
>
> Three clear-cut, rational, general courses can be followed by any state considering the problem: (1) to do nothing, relying upon the protection afforded by the AEC; (2) to adopt laws and regulations for areas not regulated by the AEC, thus taking up the slack in the federal program; (3) to adopt laws and regulations which overlap federal control, and also regulate areas not touched by the federal authorities. The authors favor the second course.
>
> Adoption of the policy of self-restraint here recommended, however, need not deny the states a significant role in controlling radiation hazards within the perimeter of AEC responsibility. The states, however, must be willing to act in the capacity of agents of the national government rather than as principals.
>
> The AEC radiation control program might well be made more efficient and its limits of effective administration extended if the AEC inspection were made by the appropriate state agency whose officials already customarily monitor the locus in question. Such a procedure would be feasible only in states where the departments have at their command sufficient and adequately trained personnel.
>
> The AEC must know the identity of state officers charged with federal investigations; the AEC should pay the state agencies enough to meet the additional costs incurred; the types of inspection, the intervals between types of inspection, and the routine and special reports of inspection to be sent to AEC must be clearly understood; the AEC must not undermine the state officials by making independent checks after responsibility has been delegated except in emergency situations; enforcement authority should be retained by the AEC; and there should be a clearly designated state official responsible for the administration of the state's obligations and a clearly designated AEC liaison officer.

The Iowa Institute of Public Affairs study points out

> The difficulties inherent in the use of existing agencies for co-ordinating state atomic energy activities: conflicts of jurisdiction, overlapping and duplication of regulations, possible issuance of contradictory orders; and questions of personnel. Supervisory and policy-making positions in this field should be filled by men with special educational and experiential backgrounds; such persons are in short supply nationally, competition for their services is keen, and they are not likely to come to a subordinate position within another department.
>
> The available alternatives seem to be: (1) use existing agencies, but employ a co-ordinator—an individual, a committee, or a commission; (2) create a separate agency. The first alternative adds little to the taxpayers' burden, does not expand existing administrative structure, but may be inadequate to the job except in smaller and less industrialized states. Creation of a new central agency will probably insure a higher level of performance.
>
> The policy recommended by the National Committee on Radiation Protection in Handbook 61 is: passage of state legislation which, among other things, would create a central and independent agency, the director to be assisted by a technical advisory board of five members, all experts in various fields. The functions of the agency would be: to develop policies and programs; to determine hazards; to issue regulations and orders; to make inspections; to report deficiencies; and to take legal action when its orders and regulations are disobeyed or violated.
>
> This plan would assure a professional outlook on the work, and economize on the number of professional personnel to staff the state regulatory functions. Inspectors need not be highly educated, but simply well trained; leaving people with special educational qualifications for policy-making positions.
>
> The University of Michigan Law School study, the recommendations of which are cited in the Iowa study, proposes separating the regulatory from the enforcement functions. Rule-making functions would be assigned to a specially constituted independent agency of experts on radiation and atomic energy, responsible for issuing all regulations dealing with atomic energy. Enforcement would be left to existing state agencies. A board should be appointed to resolve jurisdictional conflicts and to assign responsibilities where law is unclear. This plan would minimize jurisdictional conflict without disturbing the equilibrium of existing state administrative patterns.

OBJECTIONS TO SOME OF THESE PROPOSALS

The arguments most frequently expressed against one or another of these solutions may now be cited:

It is often said that one of the least satisfactory solutions, in a state whose atomic energy business is of any size, is that of attempting co-ordination by means of a commission composed of administrative officers of present state government. These officers already have such numerous

and demanding duties that the duties relating to atomic energy co-ordination would have to take second place. The field is important enough to require the first and full-time attention of a co-ordinating person or agency.

Against responsibility for co-ordination being placed within any one existing department it is said that no department could assume these duties without prejudice, and that no one department contains the skills and experience needed to deal with the ramified areas in which regulation is required.

Argument is frequently brought against removing inspection and enforcement duties from the agencies now performing them. A considerable body of specific knowledge and experience has been built up by the operating personnel in the health and industrial relations departments, which should not be sacrificed to the seeming simplicity of a centralized plan. Where inspection and enforcement of many different types of installations are concerned, no single type of staff can fill the bill.

Against *any* plan which creates new high-salaried positions in the state, or a new operating budget, the argument for economy is brought.

EXPERIENCES OF INDUSTRY UNDER REGULATION IN OTHER STATES

Before summarizing our impressions of the situation a number of comments may be of interest, from representatives of nuclear industry situated in states which have comprehensive legislative or statutory regulation of such industry. Firms in Connecticut, Massachusetts, New York, and Texas were written to for comments and suggestions on nuclear legislation, derived from their own experience. Their responses are presented here, by states.

Connecticut

From a member of a company which no longer has radioactivity problems to contend with:

> * * * I have been working with your problem off and on for 10 years.
>
> I feel any control system is only as good as men make it. As I see it a central co-ordinator office is needed and the most important step should be informing *fire* departments of each setup. I have known of people being hurt because of not knowing of potential hazards under fire conditions.

Massachusetts

From the medical director of large manufacturing establishment:

> At least in Massachusetts, I believe we have all the basic laws and departments needed to control the complete handling of radioactive materials.
>
> Secondly, I believe that the legislation must be comprehensive. It must not be so restricted by specific "do's" or "don'ts" as to prevent progress, but to allow for quick and varied changes in interpretation and administration of the law—and not encourage evasion and perversion of the law.
>
> Thirdly, I believe that we cannot consolidate these problems under one department. The machinery for public health control, work-

men's compensation and transportation, for instance, is too complex and founded upon past experience to permit or justify change.

If these agencies, for example, function properly to control the health and safety of the *public* from radiation whether in transit or manufacture and of the *worker* during transit or manufacture of the material, the ultimate goal will be achieved. Most of the persons responsible for the progress in atomic energy are as responsive to sound educational recommendations as to harsh legislative penalties—if for no other reason than that errors, omissions and accidents can lead to great risks and/or expenses to the manufacturer.

Since it is the manufacturer who knows when materials are purchased, how they are transported, what processes they are to be used for, how they must be handled productionwise and where they are going, I believe that the state agency directly responsible for the health and safety of the worker and who is first and foremost the person exposed and to be protected, should know what the materials are, where they came from, where they are going and also something about the processes involved and the amounts used. This agency can control all sources of trouble from these materials most fully and completely.

I believe, therefore, that registration should be by this department; therefore, as in Massachusetts, by the Department of Labor and Industries.

Perhaps I am prejudiced because of the capable men we have had to head our Division of Occupational Hygiene in the Department of Labor and Industries. True, they have strong investigative and punitive powers, but never once in my dealings with them have they used such measures nor have I thought of them as a handicap or deterrent in their handling of our problems. It is the early and thorough advisory and consultant services that they render which I so highly value. Registration is only one step, therefore, in this procedure and in our close co-operation.

They know what we are doing. They can answer emergency calls for assistance. They will make analytical surveys to support our work and that of our workmen's compensation and insurance carriers as well as to interpret the AEC regulations for us.

They even work with us in certain research projects to make for safer handling of our materials.

I know of only one weak point in this procedure. Since their basic responsibility is for in-plant control, they should, and undoubtedly do officially, have means and methods of communication with other state departments concerned with public health such as air and stream pollution, traffic safety, fire and police departments.

Whether this function should be handled directly by them or as a recommendation requiring that the company transmit that information to the agencies I think is a procedural matter, not quickly answered.

* * * * *

In the Commonwealth of Massachusetts at least, small town health departments are made up of inexperienced or untrained lay persons, sincere but poorly paid and uninformed, totally unable to

handle such a problem. Furthermore, these communities have no staffed offices. Committees also meet infrequently. Many would not be able to distinguish between the different types of medical problems familiar to industrial hygienists or state authorities. Furthermore, the private physicians felt that they were not in a position to determine the cause of difficulty not knowing what occurred within the plant, and they certainly had no power to investigate this matter. In addition, they might lose their patient or place the patient in a precarious financial status trying to investigate such a problem and certainly on reporting it.

Perhaps the State Department of Health in California is more powerful and has exclusive control of such matters. * * * The chief problem is the complexity of the terminology and the difficulties in calculations. * * * I find that the law does need interpretation and that is why the State Department of Labor and Industries is so helpful.

* * * * *

From what I have read concerning California laws, we have nothing to offer you in the way of completeness or change. I can tell you only that I believe the wise administrator of laws does far more for mankind than a thousand words of detailed explanation. * * * Our goal is to protect ourselves, our workers and the public while still producing materials for mankind.

SUMMARY

Safe use of Radioactive Materials in Massachusetts*

I. Within the plant is a responsibility of:

- A. The Department of Labor and Industries:
  1. Division of Industrial Safety;
  2. Division of Occupational Hygiene.
- B. The City Fire Department:
- C. The inspectors of the insurance companies covering:
  1. Workmen's Compensation;
  2. Boilers;
  3. Fire;
  4. Nuclear peril reinsurance.

II. Outside the plant is a responsibility of:

- A. The Department of Public Health (this is under study for more specific regulations. Hearings were held in Boston in December, 1958):
  1. Air pollution;
  2. Stream pollution.
- B. Certain other state agencies may become involved, too, such as "Fisheries";
- C. Civil defense;
- D. Fire and police at state and city levels;
- E. Local health departments.

* A.E.C. regulations also in force naturally, too.

From the health and safety engineer of large fuel reprocessing concern:

> The Massachusetts radiation code was drafted by a distinguished advisors group in co-operation with the Department of Labor and Industries, particularly the Division of Occupational Hygiene. It is a good code. It is in harmony with federal regulations and is not overly restrictive in itself.
>
> We have benefited to some extent by having outside people come into the plant with a fresh viewpoint but, for the most part in a facility as large as ours with a health and safety staff, the state inspectors contribute little. Perhaps in a small installation whose people have limited knowledge of radiation problems, they could do some good.
>
> Certainly, visits by state inspectors take up valuable time, but this can hardly be called oppressiveness. We have, however, experienced some difficulty through interpretation of the code by "misguided" officials in the state government.
>
> The question of with what department registration of ionizing radiation sources and approval of regulations should be is a problem which Massachusetts is attempting to solve currently. It is about as mixed up as any program could be. It is our contention that registration and approval of regulations should be with a co-ordinator of atomic development even though this might place radiation control in a special category rather than on an equal with other hazard controls. We have suggested this since there are some 52 departments in the commonwealth with some connection with radiation control and feel that neither the departments have adequate knowledge to act independently, nor one department the justification to receive registrations and approve regulations for other departments. On the other hand, atomic development agencies are not set up to perform this type of function and must be changed organizationally to do so.

From the technical director of a large radiation hazards control company:

> It is our personal feeling, based on the experience of personnel at this company and other organizations, that there is a definite need for regulation and legislation on the part of state, and many times even municipal communities, depending upon the type of operations being performed. We do not feel any sense of oppressiveness from any current state regulations now in force in the State of Massachusetts.
>
> Which department should supervise the conformance to the regulations is a very complex and subtle point, since so many of the existing state departments might be involved. In my own personal opinion, I feel the responsibilities of administration of atomic activities should be under an office of the State Co-ordinator who, in turn, calls on the existing Departments of Health, Labor, etc., where they can be best employed. The final decision-making responsibilities, however, should rest within the office of the State Co-ordinator.

From the radiation protection officer of a large accelerator manufacturer:

1. We register our sources with the Massachusetts State Department of Labor, Division of Industrial Safety. This seems to us to be a logical choice. However, it should be kept in mind that our radiation sources, which are machines, can be turned off and on at will, and as such present different problems from radioactive sources, reactors, and so forth which do not have this feature. In an overall and longterm program it might be advisable to consider a separate agency to handle this work. In any case, a single division is desirable to minimize the administrative effort required to follow through on the regulations.

2. Thus far we have not encountered any problems in dealing with the state representatives that have been objectionable to us.

3. We feel it advisable to follow as closely as possible the regulations recommended by the Atomic Energy Commission and given in the Code of Federal Regulations.

4. In particular, the State of Massachusetts recommends that medical examinations be given to employees who are expected to receive in excess of 10 percent of the normal tolerance radiation dose. We do not normally expect any of our employees to receive such exposures. However, on a short-term basis we do occasionally exceed the 10 percent minimum as suggested by the state. This has necessitated medical examinations at some expense, both in terms of labor hours lost, as well as in the cost required for the examination. We find no technical basis for such a recommendation. Consequently, we feel that this regulation in particular is not justified.

From the company health physicist of a large reprocessor of radioisotopes for commercial uses:

I'm strongly in favor of a state co-ordinator of atomic development activities whose office would have the direct responsibility of the entire control over atomic installations. The present setup in most states is oppressive since "users" are subject to the controls of, and are inspected by the AEC, Department of Public Health, Department of Labor and Industries, insurance companies, fire departments and I. G. C.

We are not advocating that all of this control be under one office, but that whatever can be accomplished in that direction would tremendously benefit the industry.

I am in favor of state registration and control but feel that the present methods are not effective since most state departments are operating under strict budgets and with inexperienced personnel.

New York

From the administrative manager of a large nuclear fuel fabricating plant:

1. We think that New York State control is reasonably effective and *not* oppressive. Registration *is* required. We find this quite reasonable.

2. Would suggest that *Department of Health* be cognizant authority because they generally have people who understand the medical and biological aspects of radiation.

3. The administration of controls is as effective as the people whose job it is to administer.

From the radiation safety officer of a large radiographical services company:

As you realize, New York State operates under several codes. Industrial installations must abide by Rule No. 38 and register their sources with the Department of Labor. Medical operators are under the jurisdiction of the State Sanitary Code. Installation within the confines of New York City must register with the New York City Department of Health. For reasons which baffle all, including the Columbia University people involved in the drafting of the city code, state control seems to end at the city line. While we do not feel this situation to be oppressive, we certainly find it confusing.

During the formulation of the state and city codes, it seemed that the original intent was to make each of them unique. After spending much money and time, it was decided to use some fundamental material already in existence such as the Bureau of Standards' Handbooks on Radiation Protection and Legislation. Nevertheless, it seems that the multiplicity of codes still causes confusion. One of the letters issued by the Department of Labor said in effect "register with us, if you don't belong to us we will forward the material to the right people." I think it immaterial whether registration is with the Department of Labor or Health. The important thing is to have one agency in charge and to have jurisdiction over all medical and industrial installations in the entire state.

From the legal counsel of a large nuclear fuel preparation company:

* * * our health and safety people have informed me that we have not experienced any particular difficulties or confusion in connection with the enforcement of the New York codes. However, the lack of time-consuming duplication has to this point been due in large measure to the fact that New York State does not yet have a sufficient number of trained inspectors to carry out thorough and periodic inspections. Accordingly, the state inspections have been infrequent as compared with the periodic, thorough federal inspections. Thus far, we have had no inspections by the municipal authorities.

We are somewhat concerned that as New York's program gets under way and more experienced and larger staffs are developed, there may well be a danger of time-consuming and expensive duplication of efforts. We very much hope that this will be avoided by a comprehensive understanding between the federal, state and municipal agencies. We believe that it is highly probable that as the size and competence of the state or municipal inspection staffs increase, the federal government will withdraw from these functions and rely exclusively on state or municipal standards and inspection. With intelligent co-operation, we believe that it is en-

tirely possible that the state or municipal staffs will learn from and be trained by the existing federal staffs prior to their taking over the inspection functions completely.

From the technical director of a nuclear research company, formerly director of New York State's radiation control program:

> * * * in New York State * * * we used existing state agencies and co-ordinated the activities of these agencies through my office. Under New York State law certain departments, such as Health, Labor and Public Service are already charged generally with the responsibility for the protection of workers and members of communities, though legislation is needed for these and other concerned departments to promulgate codes and regulations in radiation protection. In fact even if a separate agency were established, it is doubtful if this new agency could change the responsibilities of existing departments. Since the Commerce Department is the business promotional agency of the state, no real change is made by having a new industry (peacetime atomic energy) to promote.
>
> Business and labor were quite happy with the arrangement of using existing agencies. A committee of 24 men from business, labor, science and education serves in an advisory capacity, and all of them are most enthusiastic for this approach. It cuts down on the number of state agencies, eliminates overlapping of jurisdictions and incorporates commercial, peacetime atomic energy into a normal framework of governmental operation.

From the technical director of a chemical company with extensive radiation business:

> We feel that regulatory codes serve many good purposes, and in general our experience in operating under the New York State codes has been satisfactory to us, and we also understand satisfactory to the various code authorities. We feel that the New York State Labor Code is particularly effective and in our opinion well administered.
>
> Our principal comment might be that state codes should be simple, and should be administered by one department. We feel that complications resulting in registering with two or more departments or agencies is a hardship on some users of radioactive materials. We also feel that registration fees are also sometimes a hardship on their small users, especially when the fee is the same for a user possessing very small amounts as for large installations.

Texas

From the nuclear program manager of a company working at reactor development:

> The Texas regulations are patterned after the National Bureau of Standards model code, as set out in NBS Handbook 61. They are monitored by the Department of Health. State inspectors are Q-cleared, giving them access to classified areas and operations.
>
> We have been complying with the state regulations on sources of ionizing radiation, even though the Fort Worth Division oper-

ates in a government-owned facility situated on government-owned land and is, therefore, not formally required to do so. We have not found this compliance oppressive, particularly since the Texas regulations conform to the NBS standards that we follow as a matter of course in our work for the AEC and U. S. Air Force. In addition, we have found the existence of a state health physics organization quite helpful in our relations with local county and city authorities, by providing these bodies with independent reassurance on the safety of our classified operations.

On a more general plane, we believe that state regulation and inspection of radiation sources is desirable. Potentially hazardous sources of ionizing radiation are being used in increasing numbers, often by small organizations which do not possess the specialized knowledge or personnel for adequate safety planning. The safety of such operations can, it seems to us, be most effectively insured by state organizations.

Based on the favorable experience in Texas, we would recommend that registration and inspection of radioactive sources be assigned to the Department of Health. The main objective of regulations concerning radioactive [materials] is the protection of the health of all citizens, and health departments are usually already organized for similar activities in other fields.

From a radioisotope distributor:

1. [State legislation is] needed to control radiation machines and "non AEC controlled" radioisotopes.
2. There exists a distinct possibility that a state agency would tend to establish a licensing program (in effect if not in name) duplicating or supplementing that already established by the AEC which would tend to make such regulations *oppressive*.
3. I prefer a state co-ordinator provided that such an agency has one of its *primary* objectives, the goal of *encouraging* and *assisting* in the development of the use of atomic energy within the state.

From the president of a nuclear research organization:

* * * We have been in business for approximately two and a half years and during this period we have been inspected once by our Texas State Department of Health. This inspection was held simultaneously with that of the AEC and, as far as I could tell, did not differ materially from that of the AEC. I feel that controls are necessary, and I believe that the state regulations should be more inclusive than those of the AEC since there are areas that the AEC doesn't regulate. We have not found the controls in Texas oppressive.

SUMMARY AND CONCLUSIONS

To the present writer, attempting to balance the complex arguments here presented, there seems to be discernible a majority opinion (at least for a state like California which already has extremely competent

and effective departments of public health and of industrial relations) in favor of:

1. The separation of the standard-setting from the regulation-writing, inspection, and enforcement functions in the state nuclear energy program.
2. A technical committee of experts to set standards of health and safety control.
3. A central radiological laboratory is needed, with facilities and instruments to provide services for all the state departments.
4. The initiative in rule-making, the actual issuing of the regulations, inspection, and enforcement could be left to the departments which presently carry these responsibilities. Adherence to the standards recommended by the technical committee could be accomplished through consultation during the writing of the regulations, or by 30 days prior notice given to the committee for its study and recommended changes, if any.
5. An appointed co-ordinator with adequate clerical staff, could be charged with the duties of maintaining a registry of all radiation sources as recommended by the technical committee; of maintaining and publishing a comprehensive manual of all state and local radiation regulations; of acting as liaison among interested departments, among state, county, and city agencies, and between all these, the legislature, and the governor; and of assembling and disseminating information to educate the public so that it may co-operate intelligently in fitting this new tool into community life.
   a. Liaison with existing state departments could be maintained through an advisory council composed of representatives of these agencies.
   b. Information obtained through the registration of radiation sources should be promptly and automatically transmitted to the department of public health, the department of industrial relations, and to local fire and police agencies.
6. The costs of the program would include the reimbursement of the technical committee for actual time spent in their duties; the costs of the radiological laboratory; the costs of the registry program; and the salaries of the co-ordinator and his clerical staff, plus his operating budget. Presumably all these costs would be supported by the state budget. It is difficult to see how an adequate program could be set up without state expenditures for these activities, whether they be allocated under this suggested plan, or under another. However reimbursements from AEC for state inspection services rendered might help to defray some of the expenditures.
7. Additional tax-money for local government might be available through legislation removing the exemption from property taxes presently enjoyed by defense-plant installations and other agencies in the State which operate government-owned properties.

Among the specific activities, regulatory or developmental, which have been recommended to the legislative or the executive branches of state government by advisory committees in the states are:

To:

Enact law providing for co-ordination of state activities, and for expert technical advice on regulations, concerned with nuclear energy;

Appropriate funds to implement such an act;

Appropriate funds for central radiological laboratory to serve all departments;

Appropriate funds for adequate staffing and training of inspection staff of public health and industrial relations departments;

Consider legislation to remove government-owned personal property (as by defense plant installations) from exemption from local possessory interest taxes;

Memorialize Congress to amend AEC law to clarify federal-state responsibilities in the control of radiation hazards;

Memorialize Congress to permit AEC compensation to states for assistance in inspection and control of local nuclear energy installations;

Request AEC to revise its regulations on transportation of radioactive materials so as to license common carriers and prevent accidental assembly of critical amounts of these materials;

Revise workmen's compensation law to make a job-connected disability presumptive in the case of a worker who has been exposed to radiation in the course of employment and who later develops a radiation injury;

Approve nuclear insurance policy forms;

Participate and/or intervene in AEC reactor licensing procedures in the state;

Define intrastate agency jurisdiction over radiation hazards;

Appropriate funds to finance nuclear development by state-supported educational institutions;

Appoint state official representatives to regional or national developmental nuclear energy groups;

Affiliate in membership with the Atomic Industrial Forum, Inc.;

Sponsor nuclear energy conferences;

Sponsor nuclear energy exhibits;

Arrange to have a high-caliber person address the Legislature on nuclear energy problems and opportunities in California;

Sponsor training of teachers in nuclear technology;

Publish comprehensive and continuing list of regulations in state applying to nuclear energy.

APPENDIX A

MEASURING RADIATION

The unit of measurement of radiation first used, and still the most common, is the "curie," named after the discoverer of radium. It expresses the number of disintegrations (ionizing particles) of a radioactive sample occurring per unit of time (i.e., disintegrations per second, *dps*, or per minute, *dpm*). The curie takes as standard one gram of radium, so it expresses the number of ionizing particles given off by one gram of radium (together with its decay products) per second or per minute—namely, 3.7×10^{10} dps or 2.2×10^{2} dpm.[1]

Commonly used submultiples of the curie are the *millicurie* (mc) corresponding to 1/1000 of a curie, with 3.7×10^{7} dps; the *microcurie* (μc), using the Greek letter *mu*, corresponding to 1/1,000,000 of a curie, with 3.7×10^{4} dps; and the *micromicrocurie* ($\mu\mu$c), a millionth of a millionth of a curie, with 0.037, dps. One micromicrocurie equals approximately 2.22 dpm.

But measurement in curies is not sufficient to tell us all we need to know about the dose of radiation given off by radioactive material, since it measures only the *number* of disintegrations per unit time without telling us their energy or penetrating power. So other units have had to be invented.

The *roentgen* is the most widely used unit for measuring X-ray or gamma ray dosage, named after the discoverer of X-rays. The roentgen gives the dose of radiation in terms of the amount of gamma or X-ray energy absorbed by a given quantity of air. Roughly speaking, the roentgen is a measure of the ability of a given quantity of radiation to knock electrons out of an air molecule, i.e., to ionize the atoms of the air molecule. Specifically, it is the dose of radiation which produces 2.1×10^{9} ion pairs in a volume of one cubic centimeter of air. The dose *rate* is measured in terms of roentgens per hour or minute (r/hr or r/m) or in such fractions as milliroentgens per hour or minute (mr/hr or mr/m). Since by definition the *r* is a measure of gamma or X-radiations, it cannot be directly applied to doses of radiation given off by alpha and beta particles.

Accordingly another unit, the *rad*, has been introduced. The rad measures the radiation energy absorbed per unit mass of material—specifically that amount of radiation energy which results in an absorbed dose of 100 ergs per gram of material. Thus, while the amount of radiation *exposure* may be measured in roentgens, the amount which is actually absorbed will depend not only on the nature of the radiation (alpha, gamma, beta) but also on the distance (1 foot, 1 inch, and so on) between source and the material being irradiated,

[1] When powers of 10 are used, to facilitate brevity in writing figures, 10^{2} corresponds to 1 with two zeros (100), 10^{3} to 1,000, 10^{4} to 10,000, 10^{7} to 10,000,000, 10^{10} to 10,000,000,000 and so on. So 3.7×10^{10} equals 37 billion. In other words, the superscript indicates a multiplication of 10 by itself to the indicated number of times.

A *negative* superscript indicates a reciprocal. Hence 10^{-1} is 0.1; 10^{-2} is 0.01, and so on.

and on the nature of the material itself (lead, flesh, air, and so on). The rad measures absorbed dose.

Still another unit, the *rem* (roentgen equivalent man) has been invented to measure radiation in terms of the biological effect of specific types and energies of radiation upon different critical organs, or over the whole body, of man. Specifically, one rem is the quantity of any radiation which when absorbed by a human being produces the same biological damage as the absorption of one of gamma or X-rays. It should be obvious that a dose of a certain number of roentgens will have differing effects depending upon the circumstances mentioned in describing the rad, and also on the amount and specific place on the body exposed. For example, 600 r applied to my little finger would have far less damaging effect than the same dose given to my whole body.[1] In practice, a dose in rems is equal to the dose in rads multiplied by a factor representing its relative biological effectiveness (RBE). Consequently the rem is probably the most useful unit when it comes to specifying maximum permissible dosages such as are used in safety codes.[2] Of course a great deal of research is required to determine the effects of different types and strengths of radiation upon animals and man and the rem only reflects the results to date of such research.

APPENDIX B

PHYSICAL DATA FOR SOME RADIOACTIVE ISOTOPES [3]

			Approximate half-life [4]
Carbon 14	Beta		5,600 years
Potassium 40	Beta	Gamma	1.3×10^9 years
Radium 226	Alpha	Gamma	1,600 years
(Decaying to:)			
Radon (gas)	Alpha		3.8 days
Radium A	Alpha		3 minutes
Radium B	Beta	Gamma	27 minutes
Radium C	Beta	Gamma	20 minutes
Radium C'	Alpha		0.00015 seconds
Radium D	Beta	Gamma	22 years
Radium E	Beta		5 days
Radium F (polonium)	Alpha	(Gamma)	140 days
Strontium 90	Beta		28 years
(Decaying to:)			
Yttrium 90	Beta		64 hours
Caesium 137	Beta	Gamma	30 years
Iodine 131	Beta	Gamma	8 days

[1] The acute lethal dose, *LD* (single, whole-body exposure) for mature man is currently estimated at 300 rads per minute, (UN Scientific Committee report; *Op. cit.* p. 154).

[2] In interpreting the maximum permissible exposure (mpe) or dose (mpd) it is important not to equate this amount with an exposure or dose which is "safe"; any more than an engineer in designing a bridge would plan the structure so that each member is stressed up to the maximum rated loading. Such a bridge would be "unsafe," and any unnecessary exposure to radiation is an "overdose." The metaphor is one often used by Dr. G. Hoyt Whipple, formerly health physicist at the University of Rochester's atomic energy project, and now at the University of Michigan's School of Public Health, training health physicists.

[3] Data taken from: United Nations. Scientific Committee on the Effects of Atomic Radiation, *Report* (1958), p. 4.

[4] The duration of exposure from isotopes within the body depends not only on the radioactive half-life but also on the time of retention in the body, and in some instances this is much shorter than the radioactive half-life, e.g. for caesium 137: half-life 30 years, half period of retention 140 days.

APPENDIX C

RADIATION HAZARDS CONTROL PROGRAM OF CON-RAD, INC.

Every facility licensed by the Atomic Energy Commission to handle radioactive materials must comply with Part 20, Code of the Federal Register. This regulation establishes the standards for protection against radiation. Superimposed on federal requirements are an increasing number of state and local governmental regulations. Controls for Radiation, Inc. (Con-Rad) has developed a complete and comprehensive program designed to provide from a single source all services including instrumentation required for safe control of radiation hazards encountered in the handling or use of radioactive materials.

The following types of facilities are examples of installations where appreciable levels of nuclear radiations are encountered:

Nuclear powerplants	Research reactors
Propulsion reactors	Critical assemblies
Uranium ore mining	Fuel reprocessing plants
Ore processing mills	Radioisotope laboratories
Fuel fabricating plants	Particle accelerators

Each of these facilities is confronted with a large variety of radiological safety problems. A co-ordinated program must be implemented to deal with these problems in order to provide safe operating conditions and to fulfill state and federal regulations.

Con-Rad's program includes radioanalytical and bio-assay services, dosimeters and film badges for personnel monitoring, radiation surveys, leasing of advanced radiation monitoring instrumentation, decontamination services, and radioactive waste disposal procedures. The chart of Con-Rad's Radiation Hazards Protection Services on the following page summarizes the "packaged" programs available and indicates which services are recommended for each type of nuclear facility. Information reproduced with permission of Controls for Radiation, Inc. (Con-Rad), 130 Alewife Brook Parkway, Cambridge 40, Massachusetts. (See page 235)

APPENDIX D[1]

FUSION POWER

Certain *fission* reactions of uranium and plutonium possess the necessary characteristics, such as self-maintenance (chain reaction), and large release of energy, to make them suitable for use variously for production of power, and for weapons. Certain *fusion* nuclear reactions also possess these characteristics.

Nuclear fusion is the combination of two light nuclei to form a heavier nucleus, with the release of energy. Fusion reactions can take place only if the reacting nuclei possess sufficiently high energies to overcome their mutual repulsion. This means that they have, as compared with the fissions, one great disadvantage, namely, they must be heated to an extremely high temperature before their rate of reaction is usefully great.

For example, the fusion reaction of two deuterons to produce a helium nucleus and a neutron has a minimum kinetic reaction temperature of close to 400,000,000 degrees C. (Such temperatures, high as they

[1] Material in this chapter is chiefly derived from D. Van Nostrand Company, Inc., *Van Nostrand's Scientific Encyclopedia* (January 1958), p. 715, 1680; and from Atomic Industrial Forum, Inc., *The Impact of the Peaceful Uses of Atomic Energy on State and Local Government* (January 1959), Appendix 1, p. 85-86.

CON-RAD'S RADIATION HAZARDS PROTECTION SERVICES

Users	SERVICES									
	Hazards summary report	Preoperational radioactivity survey	Radiological safety education	Radiation protection procedures and standards	Leasing of monitoring instrumentation systems	Film badge	Bio-assay	Waste disposal	Operational surveys	Decontamination
Nuclear reactor operators	X	X	X	X	X	X	X	X	X	X
Nuclear reactor designers	X	X								
Mines and ore processors			X	X	X		X	X	X	X
Fuel fabricators		X	X	X	X	X	X	X	X	X
Fuel reprocessors		X	X	X	X	X	X	X	X	X
Medical and industrial radioisotope laboratories			X	X		X			X	X
High-level gamma irradiation facilities			X	X		X			X	
Particle Accelerators			X	X		X			X	
Industrial radiographers			X	X		X			X	

are, may be obtained from fission reactions.) On the other hand, once initiated, this reaction has been calculated to yield 3,250,000 electron-volts per pair of particles reacting. When it is considered that these particles have a total mass number of only 4, as compared with 233, 235 or 238 for uranium and 239 for plutonium, the energy yield per unit mass becomes very high indeed. This means that the material undergoing the fusion reaction, at a given time, would be small. Therefore, the problems arising from the size of fission reactors would not be present. Neither would there be a radioactive waste disposal problem.

For these reasons, and also because of the unlimited reserves of deuterium in the waters of the world, investigation of the possibility of using this or other fusion reactions for weapons and power, has long been under investigation in several countries. The results of these investigations were, for security reasons, kept secret for years, and even today have been declassified only to the extent of certain general information.

Thermonuclear weapons have been constructed and tested successfully. Thermonuclear power for peacetime use is still in the exploratory stage. One of the problems to be solved for the practical production of power from thermonuclear reactions is to contain the particles in the reacting region for a sufficient length of time, and without destruction of the container. One approach to the solution of this problem is to use an electromagnetic field to contain the particles. Since the reacting gas is completely ionized under the reacting conditions, passing a heavy current through it generates an electromagnetic field which causes the gas to constrict and draw away from the walls of the container. Unfortunately, this "pinch effect" apparently becomes unstable too rapidly for the purpose of the fusion reaction. In spite of such difficulties, research on thermonuclear power continues.

Practical fusion reactions will probably involve two atoms of elements such as deuterium, or tritium, both isotopes of hydrogen. Three such processes have been suggested:

(1) Combining one atom of deuterium with another atom of deuterium, resulting in one atom of helium 3 (an isotope of helium) plus a proton, plus four million electron volts of energy.

(2) Combining one atom of deuterium with another atom of deuterium, resulting in one atom of helium 3 plus a neutron, plus four million electron volts of energy.

This is about 1.5 times as much energy per pound as is released in the fission of U^{235}.

(3) Combining one atom of deuterium with an atom of hydrogen 3 (tritium, an isotope of hydrogen), resulting in one atom of helium 4 (an isotope of helium) plus a neutron, plus 17 million electron volts of energy.

This is about six times as much energy per pound as is released in the fission of U^{235}.

The last reaction proceeds the fastest, but tritium is rare since it is radioactive and not found in nature. It must be produced artificially.

These reactions require that the combining atoms must collide with very high velocities, if they are to fuse. In the stars and in the hydrogen bomb, these high velocities result from the very high temperatures

produced, but producing and controlling such temperatures in a reactor will be very difficult, especially since all known materials which might be used for the walls of the reactor melt or vaporize at temperatures of 3,000 degrees C. or less.

It seems possible to build a thermonuclear (fusion) reactor on theoretical grounds, but many practical engineering problems must be solved before even the prototype of an operating thermonuclear machine can be developed.

If these problems can be solved in a way permitting the use of an abundant element, such as the hydrogen in seawater, it is possible that we may solve the problem of the source of energy needed to keep civilization at a high level indefinitely.

APPENDIX E

COMPARISON OF 12 STATE ATOMIC ENERGY ACTS PATTERNED AFTER THE NEW ENGLAND MODEL

State; Date of enactment; Title and description of bill	*Specific provisions of act*
ARKANSAS (1957) Annotated Statutes, Supp. 1957 82-1401 "Atomic Energy and Nuclear Materials"	Modeled on N. E. act, except 1) no salary is specified for the co-ordinator and 2) no funds are provided to carry out provisions of the Act.
CONNECTICUT (1955) General Statutes of Conn. Ch. 162e Sect. 1933d-1939d "Utilization of Atomic Energy"	Modeled on N. E. act, except 1) omits to define "operator"; 2) in sect. directing state agencies to conduct studies relating to necessary changes of laws or regs. adds "No additional employees shall be hired for the purpose of carrying on such studies"; 3) no salary provided for the co-ordinator, but, unless he holds a salaried position in the state service, he is allowed $20 a day for each day actually devoted to his duties as co-ordinator, and reimbursed for necessary expenses; 4) $5,000 is appropriated to carry out provisions of the Act ($7,000 1958-1959).
FLORIDA (1957) General Laws of Florida Ch. 57-178 (S.B. 418) "An act to create and establish the Florida Nuclear Development Commission * * * provide for the terms, appointment and qualifications of its members; prescribe its	WHEREAS, * * * on Dec. 1, 1955, the Governor appointed nine citizens of the State as the Florida Nuclear Development Commission, and the members of this commission have served at their own expense in assisting the Governor in making Florida a leader among the southern states in the development and application of nuclear energy, and WHEREAS, it is to the best interest of the State of Florida to constitute a commis-

State; Date of enactment; Title and description of bill	*Specific provisions of act*
powers and duties; provide for the employment of an executive director and other personnel; provide for payment of expenses of members of the commission; make appropriation to carry out the purposes of Act; and fix an effective date of this Act.''	sion as a permanent agency of the State for the development and application of nuclear energy. * * * '' 1) establishes commission of nine members to be appointed by governor for four-year terms, to serve without compensation but be reimbursed for actual and necessary expenses; 2) sets up headquarters at Tallahassee; 3) permits commission to appoint an executive director who shall, subject to the direction of the commission, have general charge of their work. He shall serve at the pleasure of the commission, which can remove him with or without cause. His salary is to be fixed by the commission, not to exceed $10,000. He is also entitled to reimbursement for actual and necessary expenses; 4) outlines powers and duties of commission as follows: a) to employ other personnel as needed and fix their salaries; b) to co-ordinate local and state activities dealing with nuclear development; c) to keep in close contact with the nuclear development at state, national and international levels and to work closely with all groups on these levels dealing with nuclear development, nuclear science and engineering; d) to promote and support education and research relating to nuclear development * * *; e) to provide for and work with groups in the State relative to problems of regulation, insurance, safety and public health as related to nuclear energy; f) to collect and disseminate information relating to nuclear development, at the discretion of the commission; g) to assist industrial, agricultural, professional and educational groups in obtaining maximum benefits from nuclear science and engineering; h) to attract new industries to Florida based on nuclear science and engineering; i) to make recommendations to the Governor relative to legislation in the field of nuclear energy; j) to work in close harmony with the Governor and to keep him advised at all times as to their

State; Date of enactment; Title and description of bill	*Specific provisions of act*
	work; k) to send representatives to meetings and conferences on nuclear energy matters; *l*) to hold meetings and seminars in Florida to discuss nuclear development and disseminate information to the people of Florida.
KENTUCKY (1958) S. B. 166 "An Act Relating to Atomic Energy"	Purposes: To adjust laws and regulations to meet new and changing conditions in ways that will encourage and support a prudent program of information and research relative to nuclear development in the fields of education, science, agriculture, industry, transportation, medicine, public health, and all other fields of endeavor which may aid in or be benefited by nuclear development and nuclear science and engineering, while at the same time protecting the public interests. * * * 1) Directs following departments and agencies to make studies and adopt rules and regulations deemed necessary, after submitting to Advisory Committee for review 30 days before filing with the Legislative Research Commission: Department of Health, particularly as to hazards to public health and safety, including protection of air space and all ground and surface waters, in co-operation with other pollution control agencies; Department of Industrial Relations and Workmen's Compensation Board, particularly as to hazardous working conditions and time and character of proof of claims of injuries and disease and extent of compensation liable therefor; Department of Motor Transportation, particularly as to transportation of special nuclear materials and by-product materials on highways; Railroad Commission, particularly as to transportation of special nuclear materials and by-product materials by common carriers in intrastate commerce on railroads; Department of Aeronautics, particularly as to transportation of special nuclear materials and by-product materials by air; Public Service Commission, particularly as to participation by public utilities in projects developing or utilizing facilities

State; Date of enactment; Title and description of bill	*Specific provisions of act*
KENTUCKY (continued)	for industrial or commercial use; Department of Insurance, particularly as to insurance of persons and property * * * ; Department of Conservation, particularly as to natural resources; Department of Fish and Wildlife * * * particularly as to protection of wildlife; Department of Mines and Minerals, particularly as to posisibility of disposal of radioactive wastes subterranean areas; such others * * * as Governor may direct. 2) Sets up Advisory Committee on Nuclear Energy appointed by Governor to advise and co-ordinate with him, of not more than 17 members, appointed from various activities in which nuclear energy exerts greatest influence. Members of Kentucky Advisory Committee created by executive order June 13, 1957, with emergency funds succeed to membership. No salary, but reimbursed for necessary and actual travel expenses. Director of Nuclear Information, Department of Economic Development, serves as ex officio executive secretary of committee, serves as co-ordinator and provides administrative services through his parent organization for the Advisory Committee. 3) Establishes a Division of Nuclear Information in Department of Economic Development, staffed by director and other personnel as necessary; under administrative control of department to function as principal *operational* agency of state in promoting peaceful uses of atomic energy consistent with health, safety and welfare. 4) Allows injunction proceedings by Attorney General against violators of any rules or regulations promulgated under this act, including those of the Atomic Energy Commission.
MAINE (1955) Ch. 105 of the Public Laws of 1955, adding a new Chapter 52-A to the Revised Statutes of Maine (1957) "Peaceful Uses of Atomic Energy"	Identical with the N. E. act except 1) adds "source materials" and "other forms of radiation" to materials which shall be regulated by the state; 2) defines these terms; 3) omits to define "operator"; 4) adds "source materials" to the list of those which require United States licenses or permits; 5) adds "other forms of radia-

State; Date of enactment; Title and description of bill	*Specific provisions of act*
	tion'' to matters falling under the co-ordinating activities of co-ordinator; 6) no salary is specified for the co-ordinator; 7) no funds are provided; 8) agreements and co-operative arrangements with Federal Government in performing functions on behalf of the Federal Government allowed, and any appropriate agency may receive, administer and disburse any funds or contributions from the Federal Government for the purposes mentioned.
MASSACHUSETTS (1957) Annotated Laws of Massachusetts, Ch. 6, Secs. 85-93 ''Massachusetts Atomic Energy Commission''	Takes wording from the N. E. model, i.e., definitions, studies to be made by appropriate state agencies as to needed changes in laws or regulations, duties of co-ordinator, licensing procedures, and injunction procedures. Besides this: 1) sets up a commission in atomic energy, to consist of a co-ordinator who shall be chairman; and six members, appointed by governor with consent of the council, representative of industry, education and labor, with five-year terms. Except for co-ordinator, these members serve without compensation, but will be reimbursed for expenses actually and necessarily incurred in the performance of their duties; 2) the co-ordinator, appointed by the governor with the consent of the council, may be selected from among the employees of the commonwealth. He serves at the pleasure of the governor, and receives $25 a day or part thereof when serving as co-ordinator, provided he is not receiving salary as an employee of commonwealth, and is to be reimbursed for necessary expenses; 3) the commission is to meet not less than four times a year at the call of the chairman, shall be informed by, consult and advise with the co-ordinator, and make an annual report on the progress of atomic energy in the state; 4) the commission shall be provided with quarters, may hold public hearings, may travel, and may, subject to appropriations, employ such expert, clerical and other necessary services as may be

State; Date of enactment; Title and description of bill	*Specific provisions of act*
	required. It may call on state and federal officials and department heads for advice and assistance and may accept unpaid services.
NEW HAMPSHIRE (1955) New Hampshire Revised Statutes Annotated, New Chapter 162-B "Peaceful Uses of Atomic Energy"	Practically identical with N. E. model act, except that 1) no salary is provided for co-ordinator; 2) no funds are appropriated to carry out provisions of the act; and 3) "operator" is not defined.
OHIO (1957) Ohio Revised Code Annotated, Ch. 4163.01-06 "Atomic Energy Development"	Follows N. E. act for the most part, except 1) omits general policy declaration; 2) omits definition of "operator," but adds definition of "radiation"; 3) under license section adds "This section shall not prohibit or limit or require an additional license for the use of byproduct materials for medical purposes by physicians licensed to practice medicine in this state"; 4) adds to "Studies" section "The heads of appropriate state departments may cooperate with any federal department or agency in the administration of this section"; 5) under "Co-ordinator" section adds "and shall serve at the pleasure of the Governor" and omits the provision requiring that no regulation applying to atomic energy proposed by any state agency shall become effective until 30 days after it has been submitted to the co-ordinator; 6) stipulates $12,000 annual salary for the co-ordinator; 7) sets up an Advisory Board to consist of 11 members appointed by and serving at the pleasure of the governor, one member being the co-ordinator, one representing labor, one management, one being a doctor of medicine, two with scientific training relating to the atomic energy field, and five unspecified. The advisory board is to review studies, policies and activities developed under the act, and atomic developments elsewhere, make recommendations to the governor and the co-ordinator, furnish technical advice as requested. They serve

State; Date of enactment; Title and Description of Bill	*Specific Provisions of Act*
	without pay but will be reimbursed for necessary expenses; 7) no funds are appropriated to carry out the provisions of the act.
RHODE ISLAND (1956) General Laws of Rhode Island, Ch. 27, Sects. 42-27-1—42-27-4. "Atomic Energy Commission"	1) Creates a Rhode Island Atomic Energy Commission, to consist of 5 members appointed for 5-year terms by the Governor, one of whom shall be designated by him as chairman. A member is eligible to succeed himself; 2) Its duties are to make studies as to need, if any, for changes in laws and regulations administered by any agency in the state which may arise from the presence in the state of special nuclear materials and byproduct materials and from the operation of production or utilization facilities; and to make recommendations to the Governor and the General Assembly for laws or regulations or amendment to such as seem necessary and appropriate; to advise the Governor and General Assembly with respect to the atomic industrial development within the state; to co-ordinate the development and regulatory activities of the state relating to industrial and commercial uses of atomic energy; to co-operate with the federal atomic energy commission and like commissions in other states in all these matters; 3) Members serve without pay, but necessary and travel expenses are to be allowed and they may employ clerical assistance; 4) The General Assembly is to annually appropriate a sum sufficient to carry out the purposes of this Chapter.
SOUTH CAROLINA (1956) Acts 1956, No. 819 "An Act to Provide for the Development and Regulatory Activities Relating to the Peaceful Uses of Atomic Energy"	Modeled after the N.E. act except 1) omits definition of "operator"; 2) in section on "Studies," stipulates that each department named shall make recommendations to the 1957 General Assembly as to needed or appropriate laws, regulations or amendments; 3) omits section on injunctions; 4) appoints no co-ordinator; 5) provides no funds to carry out the provisions of the act; 6) repeals any act or part of act inconsistent with this one.

State; Date of enactment; Title and Description of Bill	*Specific Provisions of Act*
TENNESSEE (1957) Public Acts of Tennessee 1957, Ch. 324 (H.B.1028) "An Act to facilitate and regulate the development and utilization for peaceful purposes of atomic energy, nuclear materials, radiation as herein defined, and facilities to produce or utilize any of these."	Modeled after the N.E. act except; 1) adds "radioactive materials" and "other forms of radiation" in general declaration of policy section; 2) omits to define "operator" but adds definition of "radiation"; 3) instead of directing that studies as to needed changes of laws be made, says "that the Governor may direct" any or all of the departments and agencies of the state to conduct studies, "or otherwise obtain competent guidance as to the need"; 4) *permits* rather than directs the Governor to appoint a Tennessee Advisory Committee on Atomic Energy to serve at his pleasure, consisting of 10 citizens unspecified as to representation, who shall co-ordinate the studies and proposals of the various state agencies with each other, and with other states, with the South as a region and with the Federal Atomic Energy Commission and to keep Governor and interested agencies informed. The members are to serve without pay but be reimbursed for "necessary travel expenses in connection with attendance at official meetings of the committee or subcommittees thereof." The committee is authorized to retain full-time or part-time administrative and consultative staff assistance, with the consent of the Governor, as necessary from time to time; 5) permits heads of appropriate agencies to co-operate with the Federal Government and/or regional groups in administration of this act; 6) appropriates $25,000 per annum to carry out the provisions of the act.
WASHINGTON (1957) Ch. 43.39 of the Revised Code of Washington 1957 "Co-ordinator of Atomic Development Activities"	Modeled after the N.E. act except; 1) adds "radioactive materials" and "other forms of radiation" to general declaration of policy section; 2) omits definition of "operator" and adds definition of "radiation"; 3) appointment of co-ordinator is merely permissive: "the Governor may appoint * * *" and omits to include among his powers acting as deputy of the Governor in matters relating to atomic energy:

State; Date of enactment; Title and Description of Bill	*Specific Provisions of Act*
	4) permits Governor also to appoint an Advisory Council on Atomic Energy, to consist of five persons, serving without compensation but reimbursed for necessary expenses to the extent of $15 per day plus travel expenses. The co-ordinator of atomic development activities serves as executive secretary to the advisory council; 5) omits requirement that proposals on atomic energy matters from any department or agency may not become effective until 30 days after submitting to co-ordinator; 6) sets salary of co-ordinator to be such as the governor may direct, not to exceed $20,000; 7) permits heads of appropriate agencies to co-operate with the Federal Government; 8) appropriates no funds to carry out the provisions of the act.

APPENDIX F

TABLE OF STATE ACTIVITIES IN ATOMIC ENERGY ‡

State	On AEC Advisory Committee	State Committee Established *	Co-ordinator Authorized or Appointed †	Registration of Radiation Sources Required	Comprehensive Radiation Code Adopted	Type of Major Action Pending
Alabama **		x				
Arizona						
Arkansas **		x	x			
California	x	x			x	
Colorado	x	x		x		Code
Connecticut		x	x	x	x	
Delaware		x		x		
Florida **		x	x			
Georgia **		x	x			
Idaho		x		x		Registration (passed 1958)
Illinois		x		x		
Indiana	x					
Iowa		x				
Kansas		x		x		
Kentucky **		x	x			
Louisiana **		x				
Maine	x		x			
Maryland **		x				
Massachusetts		x	x	x	x	
Michigan	x	x		x	x	Co-ordinator law

APPENDIX F

TABLE OF STATE ACTIVITIES IN ATOMIC ENERGY ‡—Continued

State	On AEC Advisory Committee	State Committee Established *	Co-ordinator Authorized or Appointed †	Registration of Radiation Sources Required	Comprehensive Radiation Code Adopted	Type of Major Action Pending
Minnesota		x				
Mississippi **		x				
Missouri						
Montana						
Nebraska						
Nevada						
New Hampshire			x			
New Jersey	x	x		x		Registration (passed 1958)
New Mexico						
New York		x	x	x	x	
North Carolina **		x				Code
North Dakota				x		
Ohio		x	x			
Oklahoma **		x				
Oregon	x	x				
Pennsylvania	x			x	x	
Rhode Island ♯		x	x			
South Carolina **	x	x				
South Dakota				x		
Tennessee **	x	x	x			Code
Texas **		x		x	x	
Utah						
Vermont						
Virginia **		x				
Washington			x			
West Virginia **						
Wisconsin		x				
Wyoming				x		
Territory of Alaska				x		
Totals	10	30	13	14	7	6

* Committee serves as advisory group or study group to either the Governor, a state department or legislature. Some states have advisory committees only for radiation hazards.

† Individuals having title (or responsible for equivalent duties) of Co-ordinator of Atomic Development Activities appointed by the Governor or state staff official serving in an information and co-ordinating function for atomic energy.

‡ As of June 1, 1958.

** Participants in the Southern Regional Advisory Council on Nuclear Energy.

♯ State-owned reactor authorized, 1958.

SOURCE: Atomic Industrial Forum, Inc., "A Forum Survey; State Activities in Atomic Energy" (July 1958), p. 47-48.
November 1958 legislative action added from newspaper and other sources.

APPENDIX G

LIST OF STATE CO-ORDINATORS OF ATOMIC ENERGY ACTIVITIES

As of November, 1958

Arkansas—Owen Payne, Jr., State Civil Defense Director, 2215 College Street, Conway, Arkansas.

Connecticut—Henry M. Marx, Co-ordinator of Atomic Development Activities, 12 Havemeyer Place, Greenwich, Connecticut.

Florida—Don R. Livingstone, Executive Director, Florida Nuclear Development Commission (Seymour Henck, Consultant), 218 Center Building, Tallahassee, Florida.

Georgia—Robert B. Wallace, Jr., Secretary, Georgia Nuclear Advisory Commission, Atlanta, Georgia.

Kentucky—Robert H. Solomons, III, Director, Nuclear Information Division, Department of Economic Development, New Capitol Annex Office Building, Frankfort, Kentucky.

Maine—Sumner Pike, Chairman, Maine Public Utilities Commission, Augusta, Maine.

Massachusetts—Raymond I. Rigney, Co-ordinator of Atomic Development, Commission on Atomic Energy, 150 Causeway Street, Boston 14, Massachusetts.

New Hampshire—Harold K. Davison, Co-ordinator, Atomic Development Activities for New Hampshire, Public Utilities Commission, Concord, New Hampshire.

Ohio—William H. Eells, Co-ordinator of Atomic Development Activities, Columbus 15, Ohio.

Rhode Island—Arthur L. Quirk, Chairman, Rhode Island Atomic Energy Commission, University of Rhode Island, Kingston, Rhode Island.

Tennessee—Seymour Henck, Atomic Energy Advisor, Tennessee Advisory Committee on Atomic Energy, c/o Department of Budget, State Capitol, Nashville, Tennessee.

Washington—Gordon Cochrane, Co-ordinator of Atomic Development Activities, Capitol Building, Olympia, Washington.

APPENDIX H

SOME IMPORTANT NONGOVERNMENTAL AGENCIES CONCERNED WITH NUCLEAR ENERGY

Atomic Industrial Forum, Inc., New York, N. Y.[1]

This "service" organization has a membership consisting of industrial concerns, educational institutions, labor organizations, and government agencies interested or engaged in any aspect of atomic energy research, development, and operation for peacetime purposes. The objectives of the Forum are:

(a) To foster and encourage the development and utilization of atomic energy.

(b) To provide a means of consultation and co-operation in the resolution of problems of general concern relating to atomic energy.

(c) To promote the dissemination of knowledge and understanding relating to the development and utilization of atomic energy.

(d) To foster and encourage research and development relating to atomic energy.

The Forum * * * publishes a monthly digest of events and developments in all aspects of atomic energy; conducts meetings for the discussion of problems of mutual interest; publishes the proceedings of these meetings as well as special reports and surveys on various subjects of general interest; establishes committees

[1] Information from B. C. Netschert and S. H. Schurr, *Atomic Energy Applications with Reference to Underdeveloped Countries* (1957), p. 98-100.

of members for working out the solutions of problems of mutual interest; and provides inquiry and reference facilities to its members.

The Forum considers itself as an essentially domestic organization, and its emphasis in all its activities is very largely U. S.-oriented. Nevertheless, its operations do have international ramifications quite aside from the fact that its membership is international. Foreign members as of the end of 1956 numbered 68 of a total membership of 529, or 13 percent, and included governmental or private organizations or individuals from the following 21 countries:

Australia	Greece	Portugal
Belgium	Italy	Spain
Brazil	Japan	Sweden
Canada	Mexico	Switzerland
Denmark	Netherlands	Union of South Africa
France	Norway	United Kingdom
West Germany	Peru	Venezuela

The Forum has arrangements with the U. S. Government whereby 100 copies of all Forum publications are furnished for distribution in State Department diplomatic pouches for disposition in foreign countries as our embassies and consular offices see fit, and 15 copies of the monthly digest, the *Forum Memo*, are given to the U. S. Information Agency for overseas use. The Forum has helped the reverse information flow by publishing in 1955 a country-by-country *Survey of World Developments in Atomic Energy*, which is now in the process of revision.

The Forum has been especially active as a sort of information desk for foreign visitors with interest in the atomic energy field. A large proportion of these visitors currently consists of people engaged in bilateral treaty negotiations with the U. S. Government or in shopping for reactors after bilaterals have been consummated. Occasionally this service is done at the request of the AEC or State Department. Thus the Forum played host in New York City to a visiting Japanese scientific delegation and arranged for a "briefing" by atomic energy experts. In November 1956 the Forum held a one-day briefing of a nine-man delegation of West German industrialists and scientists at the beginning of a six-week tour of U. S. atomic energy facilities under State Department sponsorship.

Another international aspect of Forum activities, * * * is foreign participation in training courses run by the Forum. A course in reactor materials generated five applications from Canada, one from Belgium, and one from Spain. * * *

* * * The first direct foreign venture of the forum was a three-day meeting held at Brussels, Belgium, in November, 1956, at the invitation of the Belgian governmental-industrial atomic energy organization. The meeting, attended by over 300 representatives, included among its topics reactor concepts, reactor materials, components and services, and financial protection against atomic hazards. Both forum members and AEC personnel participated. A second meeting, in co-operation with the Japanese Forum * * * [took] place in three Japanese cities during May, 1957. Topics

covered the full range of atomic energy development, applications, and problems, and participants included engineers, scientists, and industrial personnel from all over the Far East.

National Industrial Conference Board, New York, N. Y. [2]

This management-sponsored organization has for some years held a survey course on atomic energy.

* * * This course, of one week's duration, is given recurrently to groups of some 75 business executive engineers. Foreign registration for the course has been steadily increasing.

At one time the NICB planned to hold a course in Europe during the winter of 1956-57, but with a change in staff personnel this was abandoned. A group of seven American companies in the field of atomic energy took up the opportunity and sponsored a one-week "Atomic Energy Course for Management" given in Paris in January, 1957. The course was held in four "sections" during a two-week period, with two courses running concurrently. Both European and American speakers gave lectures, which were supplemented with demonstrations and seminars. Its sponsors described the course as giving a "thorough, but nontechnical understanding of basic nuclear science and an evaluation of the industrial applications of atomic energy." All lectures were simultaneously translated in English, French, and German. Although the course was intended primarily for European participants, registrations were accepted from anywhere in the Free World.

Fund for Peaceful Atomic Development, Inc., Detroit, Michigan [3]

This nonprofit organization for international co-operation in the development of atomic energy was established in December, 1954, with funds from several private sources and foundations.

* * * The activities of the fund fall into three categories: (1) research, investigation, and publication of information with respect to peaceful uses of atomic energy; (2) the dissemination of such information abroad through provision of consultation and technical services, advice and guidance for foreign visitors, organization and dispatch of missions abroad, and the encouragement of the formation of similar organizations in other countries; (3) the promotion of systematic and unified educational and technical assistance programs for the training of foreign personnel, including the provision of essential equipment, to further self-development in other countries.

Examples of fund activities in the first category include a survey of educational and training facilities in the United States intended for the use of foreign students interested in graduate study in this Country, and a bibliography of unclassified materials in atomic energy, chiefly nontechnical. Under the second category the fund (a) sponsored a mission by Dr. Lawrence Hafstad to India, Pakistan, and Turkey to lay the groundwork for general

[2] *Ibid.*, page 101.
[3] *Ibid.*, p. 101-102.

nongovernmental co-operation with these countries in the atomic energy field, (b) co-operated with other groups in aiding the U. S. tours of several Japanese delegations, (c) was a cosponsor of the Brussels Conference, and (d) stimulated the creation of counterpart organizations (to the fund) in certain other countries. Activities of the third category included such projects as conferences on atomic energy with Mexican business and scientific leaders, which resulted in the establishment of graduate fellowships for Mexican students in nuclear engineering at the University of Michigan; and personnel assistance in the establishment of a radioisotope laboratory in Egypt.

National Planning Association, Washington, D. C.[4]

This organization engaged in a project on the productive uses of nuclear energy supported by a grant made in 1954 by Resources for the Future.

* * * The project consisted of a two-year, comprehensive study of the economic significance of nuclear energy used for industrial and agricultural development. Inquiry was directed primarily, though not exclusively, to the economic aspects of nuclear power, and considered the period 5 to 20 years ahead. The general investigation covered studies of several foreign countries, including Brazil, India, Israel, Italy, Japan, and Pakistan. The foreign studies examined the economic prospects for nuclear power in areas that may lack the essential conventional resources necessary for economic expansion. To date the study of Japan has been published (M. Sapir and S. J. Van Hyning, *The Outlook for Nuclear Power in Japan,* Washington, D. C.; National Planning Association, June 1956). In addition, the project staff co-operated with Edward S. Mason on a paper on energy requirements and economic growth, prepared as part of the United States contribution to the Geneva Conference (E. S. Mason, *Energy Requirements and Economic Growth,* Washington, D. C.; National Planning Association, August 1955).

The Council of State Governments, Chicago, Illinois [5]

* * * [This] joint governmental agency, established and supported by the states to improve legislative, administrative, and judicial practices in the states, to solve interstate problems both regional and national, and to facilitate and improve federal-state relations, has been actively studying atomic energy development. The council is the secretariat for the annual Governors' Conference and for eight national associations of state officials and has a co-operative arrangement with the National Conference of Commissioners on Uniform State Laws.

In June, 1956, the Governors' Conference included a round table on "Civilian Use of Atomic Energy." In October, 1956, the Council's Committee of State Officials on Suggested State Legisla-

[4] *Ibid.*, p. 102-103.
[5] Atomic Industrial Forum, Inc., *State Activities in Atomic Energy* (July 1958), p. 43, 46.

tion included, in the "Suggested State Legislation for 1957," a model act on "Co-ordination of Atomic Development." [This act is practically identical with the New England model act.] ("Co-ordination of Atomic Development," prepared by the Committee of State Officials on Suggested State Legislation of the Council of State Governments, October, 1956. Available in *Suggested State Legislation Program for 1957,* the Council of State Governments, 1313 East Sixtieth Street, Chicago 37, Illinois, ($1.50).)

In May, 1957, the council called a "Conference on the States and Atomic Energy Development" of representatives from the states to review the role of the states. The council has recommended a broad program of action for all states to undertake regarding atomic energy development.

In March, 1958, a subcommittee of the Drafting Committee of State Officials and the Committee on Atomic Energy Law of the National Association of Attorneys General met with representatives of the AEC to initiate work on a model state law that would permit the states to waive immunity from liability and thereby comply with the AEC's requirements that reactor owners show financial responsibility against reactor hazards (e.g. obtain insurance against atomic hazards). Six state universities have taken the position that as state agencies they do not have to, or could not, obtain insurance against liability claims as required by AEC for its licensees. [Congress has now amended the indemnity act to exempt these agencies from the $250,000 liability provision. See page 183 of Ch. VII of this study.]

The American Public Health Association, New York, N. Y.[6]

The Program Area Committee on Radiological Health of the American Public Health Association has prepared two model state atomic energy acts, one with a special state Commission on Radiation Protection being created and the other without the special commission. In offering the model acts, the committee states that "maximum uniformity (of radiation control regulations) is desirable to effect economy and efficiency for (state) government and industry." The term "unnecessary radiation" is defined in both model acts as "the use of gamma rays, X-rays, alpha and beta particles, high speed electrons, neutrons, protons and other atomic or nuclear particles or rays in such manner as may be hazardous to the health of the people or the industrial or agricultural potentials of the state." ("Model State Radiation Protection Acts," prepared by the Program Area Committee on Radiological Health of the American Public Health Association, in co-operation with a Special Committee of the Conference of State Sanitary Engineers and the Special Health and Medical Services Committee of the Association of State and Territorial Health Officers. Available from the American Public Health Association, 1790 Broadway, New York, N. Y. (no charge).)

[6] Atomic Industrial Forum, Inc., *State Activities in Atomic Energy* (July, 1958), p. 43, 46.

American Federation of Labor—Congress of Industrial Organizations, Washington, D. C.[7]

In 1955 Walter Reuther, president of the AFL-CIO, served as member of the McKinney Panel on Peaceful Uses of Atomic Energy, issuing a separate opinion concurring in general with the majority report but differing in emphasis—in particular questioning the wisdom of the AEC policy of placing prime responsibility for development of the power reactor program on private utility companies.

The AFL-CIO in February, 1957, held a conference for affiliated unions on Atomic Radiation Hazards, some 14 speeches from which are available in mimeographed form from the Washington office.

A resolution adopted at its 16th constitutional convention in April, 1957, urges the Federal Government to construct and operate a variety of full-scale atomic power plants in the United States for demonstration purposes, in preference to giving financial aid to private power companies to persuade them to undertake the task; asked Congress to review periodically the existing machinery for protection against radiation hazards, and questioned the advisability of permitting the AEC to regulate the industry which it has the obligation to promote; maintained that workmen's compensation for workers exposed to radiation exposure requires enactment of federal legislation in this field; urged removal of restrictions on publication of nonmilitary atomic information; urged support of international radiation control measures through the International Atomic Energy Agency, the ILO, the WHO and others; endorsed studies of the effects of atomic radiation under auspices of the General Assembly of the United Nations; urged Congress to establish a National Institute of Radiological Health for review by the most competent medical and public health bodies of the problems related to radiation hazards; and asked that a statutory labor-management commission be established to advise AEC on a sound program on matters of particular concern to labor-management relations.

Many AFL-CIO unions are co-operating in voluntary training and educational programs required to meet the demand for competent skilled labor in the field of nuclear energy.

An Atomic Energy Technical Committee was set up in November 1958 under the auspices of the Industrial Union Department of the AFL-CIO.

National Association of Railroad and Utilities Commissioners, Washington, D. C.[8]

The Committee on Nuclear Energy in the Electric Industry of the National Association of (State) Railroad and Utilities Commissioners reported in October, 1957 * * * the results of its studies into areas of its activities which would be affected by atomic energy development. The report covered licensing, operating standards and enforcement of atomic facilities, health and safety regu-

[7] Compiled from various AFL-CIO sources.
[8] Atomic Industrial Forum, Inc., *State Activities in Atomic Energy* (July 1958), p. 44.

lations, intrastate transportation of radioactive materials, disposal of radioactive wastes, accounting and rate problems, and co-ordination with states and federal agencies.

International Association of Industrial Accident Boards and Commissions, Washington, D. C.[9]

The Atomic Energy Committee of the International Association of (State) Industrial Accident Boards and Commissions, which represents state workmen's compensation agencies, reported in December 1956 its recommendations regarding provisions needed in state workmen's compensation laws to cover radiation claims.

The report concluded:

1. That all state laws should provide full coverage of occupational diseases.
2. Unlimited medical care should be given to the worker with no limitation as to period of time or cost.
3. A study needs to be made of the advisability of supervision of medical care so as to insure the best specialist supervision of cases of radiation disease.
4. A study also is needed of the application of second-injury laws for those individuals suffering from radiation diseases in order to facilitate their employment.
5. Also, a method of apportioning the liability, in cases where the disabled worker was exposed in a number of plants, will need to be worked out. Exposure may of course occur in more than one plant.
6. Examination and inspection of plants to determine the type and quantity of radiation present in the work area will be necessary. It will of course not always be possible to make such an inspection and to determine accurately the amount of radiation which any individual may have received.
7. Care must be exercised by all those connected with workmen's compensation to make sure that all real injuries are properly covered but that, at the same time, imagined or tenuously related injuries are dealt with in a reasonable balance.

American Standards Association, New York, N. Y.[10]

The American Standards Association was created to provide a means for developing American standards, to promote the development and use of national standards, to approve standards as "American Standards" if a consensus of all national groups substantially affected by the standards accept them, and to serve as a clearinghouse for information on standards.

A 34 member Nuclear Standards Board, one of fourteen ASA Standards Boards, was established in June 1956 to be primarily responsible for the administration and planning of national standards relating to the industrial and commercial application of nuclear energy. The scope of the Nuclear Standards Board states

[9] U. S. Department of Labor, Bureau of Standards, *Workmen's Compensation Problems*, (1956), p. 166.
[10] Atomic Industrial Forum, Inc., *State Activities in Atomic Energy* (July 1958), p. 44-45.

that, to the extent possible, standards relating to atomic energy development should be developed through existing ASA projects and gives the Nuclear Standards Board secondary jurisdiction over such activities.

Under the Nuclear Standards Board an American Standard, N-1, Glossary of Terms in Nuclear Science and Technology, was approved and adopted in 1957; and six sectional committees in the nuclear field have been established with subcommittees to date as follows:

N-2 General and Administrative Standards;
N-3 Nuclear Instruments;
N-4 Electrical Requirements for Reactors and Nuclear Power Systems and Generation and Application of Nuclear Radiation;
N-5 Chemical Engineering for the Nuclear Field;
N-6 Reactor Safety Standards;
N-7 Radiation Protection.[11]

The scope of the N-7 Sectional Committee of the American Standards Association is as follows:

1. Safety standards for the protection of persons employed in facilities associated with the production and utilization of fissionable materials against the normal routine hazards present in such facilities. This includes mines, mills, refineries, isotope separation plants, fuel element fabrication plants, critical assembly facilities, processing and reprocessing plants, working areas around nuclear reactors of all types, and during transportation of irradiated fuel elements and gross fission products.
2. Safety standards for transportation of radioactive materials over our highways, railroads, waterways, and by commercial airlines. * * *
3. The number of swimming pool (research) reactors built or planned is something like 20. * * * It is more and more important that standards for potential reactor purchasers be formed.

Committees of Other Groups

The *Chamber of Commerce of the United States* has a committee on the commercial uses of atomic energy.

The *American Bar Association* has a committee on atomic energy and the law.

The *bar associations of the cities* of Chicago, Cleveland, Dallas, New York, Los Angeles, San Francisco and St. Louis, to name a few, have atomic energy committees, as have a number of *state bar associations.*

[11] R. B. McAllister, chairman, N7 Committee of ASA, "Radiation Protection Standards", Atomic Industrial Forum, Inc., *Paper No.* 57 (October, 1957).

Professional Societies

The following professional societies are active in the field of nuclear science and engineering:

American Nuclear Society, which has a Northern California Branch and a Southern California Branch
American Physical Society
American Society of Mechanical Engineers
American Institute of Chemical Engineers
American Institute of Electrical Engineers
Institute of Radio Engineers, Nuclear Science Group

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HOME ACCIDENT PREVENTION

REPORT OF THE

SUBCOMMITTEE ON ACCIDENT PREVENTION

ASSEMBLY INTERIM COMMITTEE ON PUBLIC HEALTH

House Resolution No. 219, 1957 Session

February, 1959

MEMBERS OF SUBCOMMITTEE

RICHARD T. HANNA, *Chairman*
GEORGE G. CRAWFORD CLAYTON A. DILLS W. S. GRANT
DIANA CLARKSON, *Consultant*

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LETTER OF TRANSMITTAL

ASSEMBLY CHAMBER, STATE CAPITOL
SACRAMENTO, MARCH 3, 1959

HON. RALPH M. BROWN
Speaker of the Assembly, and
Members of the Assembly
Assembly Chamber, Sacramento

GENTLEMEN: In accordance with the provisions of House Resolutions 219 and 319 of the 1957 General Session, the Assembly Interim Committee on Public Health appointed a Subcommittee on Accident Prevention to study the problem of home and off-the-job accidents. The report containing the committee's recommendations as to needed legislation, and suggestions for further study is transmitted herewith.

Respectfully submitted,

W. BYRON RUMFORD, *Chairman*
Assembly Interim Committee on
Public Health

SUBCOMMITTEE LETTER OF TRANSMITTAL

ASSEMBLY CHAMBER, STATE CAPITOL
SACRAMENTO, MARCH 3, 1959

HON. W. BYRON RUMFORD, *Chairman*
Assembly Interim Committee on Public Health

DEAR MR. RUMFORD: Attached is the Report of your Subcommittee on Accident Prevention. This report relates the findings and recommendations resulting from the subcommittee's study and investigation during the 1957-59 interim.

The subcommittee wishes to express its appreciation to the many persons who testified at the public hearings, to the State Department of Public Health, local health departments, the staff of the California Home Safety Project, the various California chapters of the National Safety Council, and to the many others whose assistance has made this study possible.

Respectfully submitted,

RICHARD T. HANNA, Chairman
Subcommittee on Accident Prevention
GEORGE G. CRAWFORD
CLAYTON A. DILLS
W. S. GRANT

FINDINGS

1. Home and off-the-job accidents extract a heavy toll in lives and are a major cause of disabling injuries of the people of California. Such accidents, according to public health specialists, can be greatly reduced through the application of conventional public health methods and are therefore a proper and major concern of public health agencies.
2. California is fortunate in having a vast fund of information as to the extent, nature and causes of home and off-the-job accidents which is necessary for the development of prevention programs. Further, means have been devised for collecting additional data on a continuing basis.
3. There is a clear need for public health agencies, using the data and tools presently available to them, to initiate prevention programs.
4. Programs should first be directed towards the prevention of particular types of accident known to be significant and controllable. One of these, for example, is poisoning resulting from the ingestion of poisons and hazardous chemicals. Another is fire in homes and dwelling units.
5. Although there are many provisions in California law requiring the marking or labeling of harmful substances, most relate to labeling showing weights and measures or ingredients for purposes other than warning the purchaser of the presence of injurious contents. A substantial number of substances are not now required by either federal or state law to identify hazardous ingredients on their labels, or to warn users of the dangers of overuse or misuse. Existing label laws could be improved and uniformity achieved by designation of definitions for use of certain "flag" terms such as *danger*, *caution*, *flammable*, *poison*, etc., so that all would correspond to the same standard. Also, the placement of labels on retail products and uniform requirements regarding print size and color would be desirable.
6. The requirements in the State Housing Act relating to fire safety standards for dwelling units appear to be inadequate and out-of-date indicating the need for a thorough study of this act.

RECOMMENDATIONS

1. That the Department of Public Health continue and increase its activities in the field of home accident prevention and that these activities be integrated into existing departmental programs and activities, utilizing present budgetary and administrative structures. Although the subcommittee recommends against the establishment of a separate home accident prevention division or bureau within the department, it does recommend that the Legislature give sympathetic consideration to such an increase in the department's budget as may in the future seem reasonable or necessary to enable the department to carry out needed home accident prevention activities.
2. That there be additional study directed towards the development of a comprehensive hazardous substance act.
3. That legislation be enacted at the 1959 Legislative Session specifying the types of labels required on those substances now requiring labeling under California law and further that legislation be enacted requiring a precautionary label on pressurized aerosol containers used for the packaging of flammable substances.
4. That the "Kathy Fiscus" law relating to the covering and fencing of abandoned excavations be repealed and that a new measure be enacted directing local governmental agencies to require the safeguarding of any excavation or artificial opening in the earth which constitutes a danger.
5. That there be a thorough study of the State Housing Act to determine whether or not revision of the act or other new legislation is needed to strengthen fire safety provisions.

PROPOSED LEGISLATION

CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 1908

Introduced by Messrs. Hanna, Grant, Johnson, and Crawford

March 9, 1959

REFERRED TO COMMITTEE ON PUBLIC HEALTH

An act to add Chapter 10 (commencing at Section 25900) to Division 20 of, and to amend Sections 26244, 26247, 26254, and 26255 of the Health and Safety Code, to amend Sections 1064 and 1096.3 of the Agricultural Code, and to amend Sections 4168 and 4171 of the Business and Professions Code, relating to labeling of containers of dangerous drugs, poisons, and other hazardous substances.

The people of the State of California do enact as follows:

SECTION 1. Chapter 10 (commencing at Section 25900) is added to Division 20 of the Health and Safety Code, to read:

CHAPTER 10. LABEL REQUIREMENTS

25900. Cautionary statements which are required by law, or regulations adopted pursuant to law, to be printed upon the labels of containers in which dangerous drugs, poisons, and other harmful substances are packaged shall be printed at the top of the label on the front of the container or immediately above the manufacturer's or dispenser's directions for use.

25901. The cautionary statements shall be printed in a type size having a direct relation to the size of the label panels upon which the statements are to appear.

LEGISLATIVE COUNSEL'S DIGEST

A. B. 1908 as introduced, Hanna (Pub. H.). Labeling of dangerous drugs, poisons, and other hazardous substances.

Adds, amends various secs., H. & S. C., Ag. C., B. & P. C.

Prescribes manner in which cautionary statements on labels of containers of dangerous drugs, poisons, and other hazardous substances are to be printed and makes violation a misdemeanor.

25902. The statements shall be printed in boldface capitals type of a size no smaller than the minimum specified in the following table:

Size of label panels in square inches	Minimum type size
Less than 5.0	6 point
5.0 but less than 8.0	10 point
8.0 but less than 21.0	12 point
21.0 but less than 35.0	14 point
35.0 but less than 50.0	18 point
50.0 or over	24 point

25903. Unless a specific color is prescribed, the cautionary statements may be printed in any color, but preferably red, upon a plain and distinctly contrasting background.

25904. The words "safe," "safely," "safety," or words having the same meaning which would detract from the value of the cautionary statement shall not be used upon the labels of containers of dangerous drugs, poisons, and other harmful substances.

25905. Any violation of this chapter is a misdemeanor.

SEC. 2. Section 26244 of said code is amended to read:

26244. A drug or device shall be deemed to be misbranded unless its labeling bears (1) adequate directions for use; and (2) such adequate warnings against use in those pathological conditions or by children where its use may be dangerous to health, or against unsafe dosage or methods or duration of administration or application, in such manner and form, as are necessary for the protection of users.

The cautionary statements shall be printed as prescribed in Chapter 10 (commencing at Section 25900), Division 20 of this code.

If any requirement of clause (1) of this section as applied to any drug or device is not necessary for the protection of the public health, the board shall promulgate regulations exempting such drug or device from such requirements.

SEC. 3. Section 26247 of said code is amended to read:

26247. A drug shall be deemed to be misbranded if it has been found by the board to be a drug liable to deterioration, unless it is packaged in such form and manner, and its label bears a statement of such precautions, as the board shall by regulations require as necessary for the protection of public health. *The cautionary statements shall be printed as prescribed in Chapter 10 (commencing at Section 25900), Division 20 of this code.*

No such regulation shall be established for any drug recognized in an official compendium until the board has informed the appropriate body charged with the revision of such compendium of the need for such packaging or labeling requirements and such body has failed within a reasonable time to prescribe such requirements.

SEC. 4. Section 26254 of said code is amended to read:

26254. A drug shall be deemed to be misbranded if the package as offered for sale at retail or wholesale fails to bear a statement on the label of

(1) The quantity of any morphine, opium, cocaine, heroin, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate, barbituric acid, bromal, carbromal, coca, marijuana, paraldehyde, peyote, or sulfonmethane, and

(2) The quantity of any chemical derivative of such substances or any derivative or preparation of any such substances, contained therein, which derivative has been by the board after investigation, found to be, and by regulations under this act, designated as, habit forming, unless its label bears the name and quantity or proportion of such substance or derivative and in juxtaposition therewith the statement "Warning—may be habit forming." *The warning shall be printed as prescribed in Chapter 10 (commencing at Section 25900), Division 20 of this code.*

SEC. 5. Section 26255 of said code is amended to read:

26255. (1) A drug intended for use by man which:

(a) Is a habit-forming drug to which Section 26254 applies; or

(b) Because of its toxicity or other potentiality for harmful effect, or the method of its use, or the collateral measures necessary to its use, is not safe for use except under the supervision of a practitioner licensed by law to administer such drug; or

(c) Is limited by an effective application under Section 26288 to use under the professional supervision of a practitioner licensed by law to administer such drug, shall be dispensed only (i) upon a written prescription of a practitioner licensed by law to administer such drug, or (ii) upon an oral prescription of such practitioner which is reduced promptly to writing and filed by the pharmacist, or (iii) by refilling any such written or oral prescription if such refilling is authorized by the prescriber either in the original prescription or by oral order which is reduced promptly to writing and filed by the pharmacist. The act of dispensing a drug contrary to the provisions of this paragraph shall be deemed to be an act which results in the drug being misbranded while held for sale.

(2) Any drug dispensed by filling or refilling a written or oral prescription of a practitioner licensed by law to administer such drug shall be exempt from the requirements of Sections 26241, 26242, 26243, 26244, 26245, 26246, 26247, 26250, and 26254, and the provisions of Section 26249 deeming a drug misbranded if its container is so formed, made, or filled as to be misleading, except the packaging requirements of Sections 26245, 26246 and 26247. If the drug bears a label containing the name and address of the dispenser, the serial number and date of the prescription or of its filling, the name of the prescriber, and, if stated in the prescription, the name of the patient, and the directions for use and cautionary statements,

if any, contained in such prescription. *The cautionary statements shall be printed as prescribed in Chapter 10 (commencing at Section 25900), Division 20 of this code.* This exemption shall not apply to any drug dispensed in the course of the conduct of a business of dispensing drugs pursuant to diagnosis by mail, or to a drug dispensed in violation of subdivision (1) of this section.

(3) The board may by regulation remove drugs subject to Section 26254 and Section 26288 from the requirements of subdivision (1) of this section when such requirements are not necessary for the protection of the public health.

(4) A drug which is subject to subdivision (1) of this section shall be deemed to be misbranded if at any time prior to dispensing its label fails to bear the statement "Caution: Federal law prohibits dispensing without prescription," or "Caution: Not to be dispensed without a prescription." *The cautionary statements shall be printed as prescribed in Chapter 10 (commencing at Section 25900), Division 20 of this code.* A drug to which subdivision (1) of this section does not apply shall be deemed to be misbranded if at any time prior to dispensing its label bears the caution statement provided for in this subdivision.

(5) Nothing in this section shall be construed to relieve any person from any requirement described by or under authority of law with respect to drugs now included or which may hereafter be included within the classifications stated in Division 10 *(commencing at Section 11000)* of this code.

SEC. 6. Section 1064 of the Agricultural Code is amended to read:

1064. Economic poison is misbranded when:

(a) The package or label thereon bears any false or misleading statement, design, or device regarding such article or the ingredients or substances contained therein.

(b) The package or label is falsely branded as to the place of manufacture or production.

(c) It is an imitation or offered for sale under the name of another article.

(d) It is labeled or branded so as to deceive or mislead the purchaser.

(e) The contents of the package as originally put up have been removed in whole or in part and other contents placed in such packages, or the contents of the package are of a quality below that of the guarantee on the label or on the application for registration of the economic poison or of the analysis of the representative sample delivered in connection with the application for registration of the economic poison.

(f) In package form, and the contents, if stated in terms of weight or measure, are not plainly and correctly stated on the outside of the package.

(g) The label fails to state either

(1) The name and percentage of each active ingredient, together with the total percentage of the inert ingredients, in the economic poison; or

(2) The name of each active ingredient, together with the name of each and total percentage of the inert ingredients, if any there be, in the economic poison.

If the preparation is highly toxic to man, as determined by rules and regulations of the director, option (1) only shall apply.

The statements required by that option shall, if the preparation is highly toxic to man, be printed as prescribed in Chapter 10 (commencing at Section 25900) of Division 20 of the Health and Safety Code.

(h) The economic poison contains arsenic in any form and the label fails to state, in addition to one of the options required by provision (g) of this section, the percentages of total and water-soluble arsenic, each calculated as elemental arsenic.

SEC. 7. Section 1096.3 of said code is amended to read:

1096.3. The label shall contain all of the following:

(a) The name, brand, or trademark of the livestock remedy;

(b) The name and principal address of the applicant;

(c) The minimum net contents of the container;

(d) A statement of the disease or ailments of livestock which it is claimed that the livestock remedy will alleviate or cure;

(e) Adequate instructions as to use and administration and adequate warnings against improper use and administration of the livestock remedy;

(f) The name of each active drug ingredient;

(g) The words "livestock remedy—not for human use," in large bold-face type in a conspicuous place;

(h) If the livestock remedy is a hazardous remedy, the words "hazardous remedy" in conspicuous letters.

The cautionary statements shall be printed as prescribed in Chapter 10 (commencing at Section 25900), Division 20 of the Health and Safety Code.

SEC. 8. Section 4168 of the Business and Professions Code is amended to read:

4168. The poison label required by this article to be placed on all packages of poison, shall contain the word "poison" and the "vignette" representing the skull and crossbones, printed upon red paper in distinct white letters, or in distinct red letters upon white paper, and shall contain the name of the article or contents of the package, the name and place of business of the person or firm packaging the poison. The particular label requirement for the antidote adopted by the board for the poison sold (and no other) shall also be upon the poison label or be attached to the package.

The cautionary statements shall be printed as prescribed in Chapter 10 (commencing at Section 25900), Division 20 of the Health and Safety Code.

SEC. 9. Section 4171 of said code is amended to read:

4171. Wholesale dealers and pharmacists shall affix or cause to be affixed to every bottle, box, parcel or other enclosure of an original package containing any narcotic as defined in Article 1 *(commencing at Section 11000)* of Chapter 1 of Division 10 of the Health and Safety Code, a suitable label or brand with the word "poison" thereon. *It shall be printed as prescribed in Chapter 10 (commencing at Section 25900) of Division 20 of that code.*

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CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 1785

Introduced by Mr. Hanna

March 3, 1959

REFERRED TO COMMITTEE ON MUNICIPAL AND COUNTY GOVERNMENT

An act to repeal Section 24400 of, and to add Section 24400 to, the Health and Safety Code, relating to dangerous excavations.

The people of the State of California do enact as follows:

SECTION 1. Section 24400 of the Health and Safety Code is repealed.

SEC. 2. Section 24400 is added to said code, to read:

24400. The board of supervisors of each county and the governing body of each city shall enact an ordinance requiring the covering, fencing or other safeguarding of any types of excavations or artificial openings in the surface of the earth within the county or city which they deem to constitute a danger to any person legally on the land upon which the excavation or artificial opening is located or to minors under the age of 12 years.

The county health officer or the city health officer, or the officer who exercises the powers and duties of the city health officer, shall investigate and determine whether excavations or artificial openings in the surface of the earth within his jurisdiction violate the ordinance enacted, and, if he so determines, he shall order the immediate covering or fencing of such excavation or artificial opening.

Any person owning land or legally in possession thereof who, within a reasonable time, fails to comply with such an order of a health officer shall be guilty of a misdemeanor.

LEGISLATIVE COUNSEL'S DIGEST

A. B. 1785 as introduced, Hanna (Mun. & C. G.). Dangerous excavations.

Repeals and adds Sec. 24400, H. & S. C.

Provides for regulation of dangerous excavations by county or city ordinances rather than by statute. Requires local health officers to examine excavations and, if found to be in violation of a county or city ordinance, to order protective action. Makes noncompliance with a local health officer's order a misdemeanor.

COMMITTEE REPORT

INTRODUCTION

The Subcommittee on Accident Prevention of the Assembly Interim Committee on Public Health was appointed following adjournment of the 1957 legislative session to study the home accident problem in California to determine whether or not there was a need to establish a state-conducted prevention program or to enact any other legislation relating to home or off-the-job accidents.

The subcommittee was specifically directed to study AB No. 953, 1957 Session. This measure would have, had it passed, appropriated $57,000 to the State Department of Public Health so that it could conduct "a program for the prevention of accidental injuries occurring in homes or in relation to family or recreational activities."

Particular types of "off-the-job" accidents were studied by the committee. For example House Resolution No. 319 directed that a study be made of the so called "Kathy Fiscus Law" relating to the covering and fencing of abandoned excavations. Another measure referred to the subcommittee was AB No. 61, 1957 General Session, relating to the use of firecrackers. The committee met in San Francisco to consider the problems relating to the use of firecrackers in that city and to review state and local statutes regulating their use.

Of particular concern to the members was the problem of poisons and toxic substances as a cause of death and injury. The committee met informally on several occasions with persons interested in this problem and held one meeting in Sacramento on February 11, 1958, with representatives of those state agencies which have responsibilities in this field.

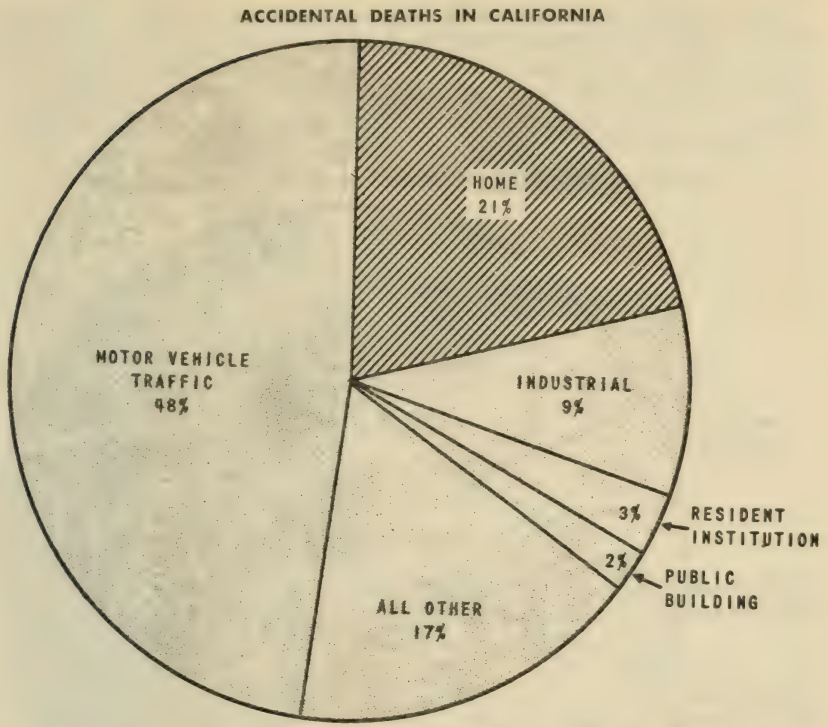
Other public hearings were held on September 12, 1957, in Fullerton, and on November 19 and 20, 1957, in San Francisco. At these hearings the committee heard testimony from representatives of public health departments, both state and local, National Safety Council chapters, insurance companies, parents' associations, fire department officials, private doctors, and others.

This report reviews the nature and extent of the home accident problem in California, discusses some of the specific types of accident, and presents recommendations as to a general home accident prevention program, specific legislation which the committee feels necessary, and suggests areas where further study is needed.

THE HOME ACCIDENT PROBLEM IN CALIFORNIA [1]

Accidents are the third leading cause of death in California. About one-fifth, or 21 percent, of these accidental deaths are the result of an injury in the home. Table 1 shows where these accidents occur.

[1] Data on home accidents unless otherwise indicated was obtained from the California State Department of Public Health, Home Safety Project, *Final Report*, 1953-1957, October, 1957, and Department of Public Health, *The Accident Problem in California*, August, 1957.



SOURCE: California State Department of Public Health Death Records; California State Department of Highway Patrol, 1955 Annual Statistical Report; California State Department of Industrial Relations, Division of Industrial Safety, Work Injuries 1955.

Table 1

PLACE OF OCCURRENCE OF FATAL ACCIDENTS—(NONTRANSPORT) [1]

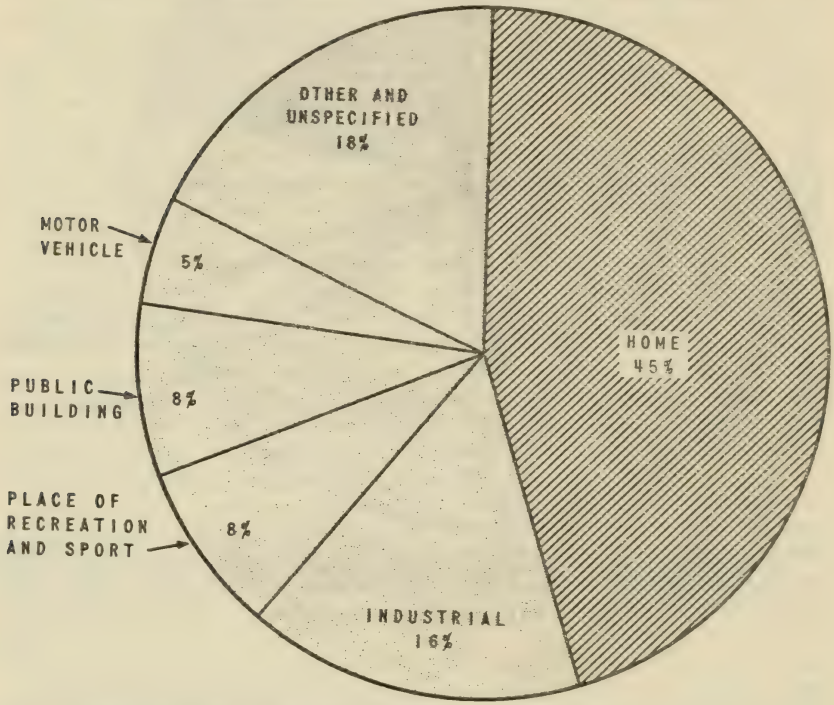
California, 1955

Rank	*Place*	*Number*
1	Home	1,486
2	Resident institution	224
3	Ocean, river, lake, and creek	200
4	Street and highway	165
5	Industrial place or premises	145
6	Public buildings	103
7	Farm	97
8	Dam, canal, reservoir, irrigation	78
9	Woods and field	60
10	Place for recreation and sport	53
11	Mine and quarry	9
	Other and not specified	444
	Total nontransport accidents	3,064

[1] Compiled from Final Report, 1953-1957, Home Safety Project, California State Department of Public Health. Table 3, p. 41.

Home accidents are the leading cause of disabling injury. Witnesses at the committee hearings reported that there are some one and three-quarter million disabling accidents each year in California—accidents that keep the person from his usual activities. Seven hundred eighty thousand or 45 percent of these injuries result from a home accident. See figure and Table 2 below.

NONFATAL DISABLING ACCIDENTAL INJURIES IN CALIFORNIA



For interview period May, 1954-April, 1955.

SOURCE: California Health Survey and Home Safety Project, California State Department of Public Health.

Table 2

PLACE OF OCCURRENCE OF NONFATAL ACCIDENTS—(NONTRANSPORT) [2]

California

Rank	*Place*	*Rate per 1,000 persons per year Total—all ages*
1	Home	392
2	Industrial place	84
3	Place of recreation and sport	57
4	Street and highway	45
5	School	35
6	Other public buildings	26
	Other and unspecified	70
	Total	708

[2] *Ibid.* Table 45, p. 152.

What causes these accidents? Falls, fire and explosion, poisoning and drowning in that order, the leading causes of accidental deaths in California homes in 1956. Further information may be seen in Table 3.

Table 3

DEATHS FROM NONTRANSPORT ACCIDENTS BY PLACE ACCIDENT OCCURRED

California, 1956

(By place of occurrence)

Cause of death	*Total*	*Home*	*Farm*	*Quarry*	*Industrial place and premises*	*Place of recreation and sport*	*Street and highway*	*Public building*	*Resident institution*	*Other*
Nontransport accidents, total	3,365	1,699	89	13	152	50	129	122	261	850
Poisoning by solids and liquids	245	190	--	--	1	1	1	24	4	24
Poisoning by gases and vapors	84	67	1	--	5	--	3	6	--	2
Falls	1,354	721	12	3	35	11	77	59	226	210
Other accidents, total	1,682	721	76	10	111	38	48	33	31	614
Blow from falling object	75	11	3	--	16	1	3	1	--	40
Machinery	106	5	34	4	26	--	9	2	1	25
Electric current	57	14	5	--	14	2	9	2	--	11
Fire and explosion	459	385	5	--	21	--	4	11	6	27
Hot substances, corrosive liquid and steam	27	17	--	--	3	--	2	--	2	3
Firearms	113	54	10	--	6	--	4	4	--	35
Obstruction and suffocation by food	134	56	1	--	1	--	--	7	14	55
Mechanical suffocation	72	51	1	--	6	--	4	1	--	9
Drowning	387	60	13	4	2	31	--	--	1	276
Excessive heat and insolation	11	1	--	--	--	--	--	--	--	10
Other	241	67	4	2	16	4	13	5	7	123

SOURCE: State of California, Department of Public Health, Death Records.

While most of the deaths due to home accidents occur to people over 65, children between 5 and 14 have the most disabling accidents and children under five have the most medically attended accidents.

No statistics can measure the cost of these accidents to the individual victims and their families. Nor can they measure the economic loss to the individual, industry or the State. The following statement by the Public Health Department is a partial indication of the cost to workers in California.

> "Five thousand workers in California suffer around three million injuries each year. Of these about one and a half million occur at work. Of the one and a half million occurring elsewhere, approximately one million occur at home. Fifty-one thousand of these are disabling.
>
> "As an indication of the amount of money involved in disabling, off-the-job injuries to workers, records of the State Department of Employment for the year 1954 show that:
>
> 11 percent of the total number of claims for disability insurance were due to off-the-job injuries (11 percent of $296,410—$32,605)
>
> 10 percent of total costs were due to off-the-job injuries (10 percent of $78,445,580—$7,844,558)
>
> "From the California Health Survey, we find that about half of a worker's off-the-job injuries occur at home. Assuming that this ratio holds true for Unemployment Compensation Disability Plan claimants, there would be roughly half of the 32,000 or 16,000 claims as a result of home injuries. Each of these injuries cost an average of $242.62.
>
> "Add to this cost an average of $60.00 for medical, surgical and hospital services (paid from the employee's pocket, from the employer as a 'fringe' benefit, or from some insurance plan subscribed to in addition to the UCD Plan) bringing the average up to $302.62 per case. This brings the total cost of home accidental injuries to workers in Califronia to over four and a half million dollars a year.
>
> "Some of these workers suffer economic death since they and their families must be supported by the State for an indefinite period of time."

The State pays a significant part of the total cost of accidental injury through other programs in which it participates. For example, a portion of the costs of accidental injury are undoubtedly paid by the State through its Aid to Needy Children and Old Age Assistance Programs.

It is now realized that home accidents are a proper and major concern of public health agencies, and, further, that the number of the accidents can be greatly reduced through the application of conventional public health methods.

An essential first step in the development of a prevention program is knowledge of the extent and nature of the problem. California is fortunate in having this type of information available now for the development of specific prevention programs. Detailed data on the age and sex of persons involved in accidents, on location and type of acci-

dent, and on objects involved have been compiled as the result of a four-year study conducted by the staff of the Home Safety Project, State Department of Public Health.

CALIFORNIA HOME SAFETY PROJECT

An increasing interest of public health agencies in home accident prevention has been stimulated in large part by the W. K. Kellogg Foundation grants to state and local health departments for exploratory demonstration programs. The foundation has granted funds for home accident projects to the state health departments in Georgia, Kansas, Kentucky, Maryland, Massachusetts, North Carolina, and Oregon and to local health departments in San Jose, California; Cambridge, Massachusetts; Mansfield, Ohio; and Kalamazoo, Michigan.

In California, foundation funds totaling $159,000 were granted to the Department of Public Health. With these funds, the California Home Safety Project was established; during the four years of its existence, from September, 1953, to September, 1957, it conducted an intensive study to:

1. Measure the home accident problem in the State;
2. Develop methods whereby the effects of the program could be measured;
3. Identify the important causes of home accidents;
4. Develop methods which health departments can use to prevent accidents.

As a result of this study, California has more detailed data concerning the nature, cause and results of home accidents than has ever before been available. This information has been of great value in pointing out to local health departments and other agencies and organizations the areas where prevention activities should be directed. It will continue to be of value in the development of new prevention activities and programs.

In addition to supplying this information, the project staff devised a number of new tools for the development of prevention programs. The practicality of these tools was demonstrated in programs conducted by local agencies and by other special project studies. These tools include:

1. A system for the continual reporting of accidents at the local level. It was found that reports from hospital emergency rooms provide a good index of a community's accident problem.
2. A system for the classification of accidents. This system permits a detailed description of accident types and causes felt necessary for conducting a prevention program.

Among its other activities, the project staff served as the California agency for the National Safety Council to collect information relative to home safety programs throughout the State, worked with the Conference of Local Health Officers and with local health departments and various community groups in accident prevention program development.

EXISTING ACCIDENT PREVENTION PROGRAMS

State Department of Public Health

Since the termination of the Home Safety Project in September, 1957, no specific bureau or division within the Department of Public Health has been assigned the responsibility for conducting a home accident prevention program. However, since, it is recognized that home accident prevention is a public health responsibility, the department is conducting a limited program in several areas. It has assisted several local health departments, notably Contra Costa, San Francisco, San Jose, and Santa Barbara in the further development of accident prevention programs. Furthermore, the department has continued to work with the Alameda, Berkeley, and Contra Costa Health Departments in studies of the epidemiology of poisoning. Assistance has also been given in the development of key poison information centers in California in close liaison with the National Clearinghouse for Poison Control in the U. S. Public Health Service.

The department supplied the committee with the following summary of its activities as of October, 1958:

1. Assistance to local health departments:
   a. *Contra Costa County.* Principal assistance here has been in the provision of special project funds ($40,000) for a two-year study of the effectiveness of home visits in the reduction of family accidents. It has also supplied considerable technical consultation to the Contra Costa County Health Department in connection with this project.
   b. *San Francisco.* On several occasions during the past year, it has provided technical consultation to the San Francisco Health Department in connection with child safety activities.
   c. *San Jose.* During the past year, technical assistance has been given to the San Jose City Health Department in conjunction with their National Institutes of Health financed home safety project.
   d. *Santa Barbara.* Technical consultation and statistical services have been provided to assist the Santa Barbara City Health Department in testing the effectiveness of a community-wide educational program in reducing the frequency of poisonings in young children.
   e. *Alameda-Contra Costa Counties.* Assistance has been given the Alameda-Contra Costa Medical Association and the Alameda, Berkeley and Contra Costa Health Departments in the development of a child accident reporting system and in a study on the epidemiology of childhood poisoning.
2. Since March, 1957, the department's Bureau of Maternal and Child Health has acted as the state clearinghouse for poison control. It has assisted in the development and maintenance of poison information centers throughout California and served as liaison with the national clearinghouse for poison control in the Public Health Service.

3. The department has applied to the National Institutes of Health for financial support of a three-year study of the epidemiology of childhood accidents to be carried out in Alameda and Contra Costa Counties.
4. The Bureau of Adult Health has assumed the department's responsibilities in connection with motor vehicle accidents, including liaison with the Department of Motor Vehicles and the California Highway Patrol. It also offers staff assistance to the Medical Division of the Governor's Traffic Safety Conference.
5. The Bureau of Records and Statistics has continued to supply the State Fire Marshal and the Department of Fish and Game with information concerning deaths from fires and firearms respectively.
6. A number of units in the department have been involved in the answering of requests for information regarding accidents, participating in safety workshops and in provision of health educational materials and exhibits.

Conference of Local Health Officers

Two accident prevention subcommittees were appointed in 1956 to consider home accident prevention, to exchange ideas with other local health departments, and to prepare a home accident prevention guide for local health departments. The California Home Safety Project staff worked with the conference on the guide and together they prepared an outline of activities which could be undertaken by local health departments.[1]

The U. S. Public Health Service

The work of the accident prevention program of the Bureau of State Services includes the collection and analysis of data, the development of accident reporting systems, educational and informational services, epidemiological investigations, experimental studies and technical assistance and consultation. A group of studies has been planned to learn the role of physical conditions, emotional factors, and attitudinal characteristics of persons involved in accidents, to determine which factors or causes can most easily or feasibly be eliminated or controlled, and to study the adequacy of care available for treating accident victims.

At the request of the American Academy of Pediatrics and the American Public Health Association, a national clearinghouse for poison control centers was established. This unit will help spread information about new toxic products, effective methods of treatment to local poison control centers. Another part of the program is a study of trends in fatal and nonfatal poisonings.

National Safety Council

The Home Safey Conference of the council is responsible for its home safety activities. A pamphlet from the council states that "the council works to stimulate interest, to provide educational tools, to assist in community program plans, and to advise and consult on organization and procedure. Home safety is approached through industrial off-the-

[1] See California State Department of Public Health, Home Safety Project, *Final Report*, for information on the development of local health department programs.

job programs, medical and public health agencies, home builders and manufacturers of household equipment, and community service groups."

In California, local chapters of the National Safety Council are located in Oakland, San Francisco, and Los Angeles, Fresno, Sacramento, San Diego, Santa Clara County, San Joaquin County, Long Beach and Bakersfield. Other safety councils, not affiliated with the National Safety Council or without a full-time paid director are located in Modesto and Merced, Santa Cruz, Marin County and Contra Costa.

Insurance Companies

One of the principle contributions of the insurance industry has been the leadership and encouragement given the health agencies for the establishment of local accident prevention programs. Metropolitan Life Insurance Company has been more active in the home accident field than has any other insurance company. Miss Elizabeth Kasey, Home and Child Safety Consultant for Metropolitan Life, in testifying at the September 12th hearing, reported that the company instigated its program in 1954. Prior to that time, the company spent most of its effort in the field of industrial and traffic safety. She indicated that the company's work on these various problems has been in three basic areas:

1. Demonstration of the problem;
2. Consultation with appropriate official or voluntary agencies, and assisting them to develop programs;
3. Preparation of supplementary educational materials.

Miss Kasey emphasized that the company does not carry on a home or child safety program per se—rather they offer assistance to other agencies to improve their programs.

A letter to the committee from the Metropolitan Life Insurance Company on August 29, 1957, stated:

> "The Metropolitan conducts a continuing home safety education program designed to reach many interested communities in the Country. Our main line of endeavor is the dissemination of home safety materials. These are distributed by our insurance representatives to policyholders and others and additional supplies are made avaliable to health and education organizations for use in local and statewide projects.
>
> "The Metropolitan does not carry on any research by its own staff but does promote research by other groups by providing consultant service and referring inquirers to research material.
>
> "We rely on state and local health and safety organizations to develop programs in their respective areas and we co-operate with these groups by supplying visual education material and consultant services. Our insurance representatives often take an active part in promoting local safety campaigns and drives."

The committee directed a letter to a number of other insurance companies to learn of their activities in home accident prevention. The majority of companies contacted by the committee wrote that they do not conduct any type of program. Others conduct limited programs

consisting of the provision of education materials or the encouragement of accident prevention activities by others.

Prudential Life Insurance Company, for example, wrote the committee on October 10, 1957, that:

> "The Prudential does not conduct an educational program in the broad field of home safety. However, we have done considerable work in the area of child safety. This program reached a peak in 1955 when the governors of the 11 western states declared an official child safety week and through publicity released by the many health departments brought considerable attention to bear upon the problems involved in preventing childhood accidents. Since that time, our efforts have been confined to making available a film of child safety called 'Mrs. Hazard's House.' In addition we mail upon request literature and check lists."

Liberty Mutual in a November 7, 1957, letter wrote that health consultants on the medical staff assist policy holders in the development of employee health programs and encourage group policyholders to set up home safety programs. "This program, which we call an extended health and safety program, provides our group disability policyholders with a service directed toward controlling injuries and illnesses of employees and their families. The approach we are presently emphasizing is the home mailing program."

Other companies, for example New York Life and Aetna Life Affiliate Companies, have developed educational materials which are used by policyholders and various organizations.

Activities of the insurance industry, such agencies and organizations as the National Safety Council, the U. S. Public Health Service and the Kellogg Foundation have provided an invaluable stimulus for the establishment of an increasing number of programs by voluntary agencies and particularly by public health agencies. The Home Safety Project, designated as the agency to collect information on home safety projects throughout the state for the National Safety Council's Home Safety Inventory, found that there were over three times as many agencies and associations participating in home safety activities in 1956 as there were in 1955.

There has been a very significant increase in the number of health departments with programs or planning to have programs. Service clubs, parent-teacher associations, fire departments, schools, industries, medical and other professional organizations, state farm groups, insurance companies, and state governmental agencies such as the Agricultural Extension Service, the fire marshal and the Department of Social Welfare are all conducting home accident prevention activities of one type or another.

A PROGRAM FOR CALIFORNIA

The agencies and organizations now conducting programs feel that their prevention activities would be more fruitful if they were provided with additional factual information, if there were more co-ordination of the now independent programs and activities, and if there were a central agency within the state to provide needed consultation and assistance.

Criticism has been leveled at the nature and effectiveness of some of the existing programs. Dr. Charles M. Cameron in an article entitled "Public Health's Unmet Needs in Home and Farm Safety," asked whether or not the safety techniques most often used will reduce accidents.

> "Traditionally, safety activities have been heavily seeded with informational and promotional programs. Tremendous efforts over the years have been poured into short-term campaigns, safety drives, promotional programs utilizing the media of public information, and literally millions of dollars have been spent on pamphlets, booklets, and posters. In launching community safety activities this influence has strongly colored the efforts made by the public health agencies. We have been all too quick to busy ourselves in planning additional campaigns, in preparing yet one more safety booklet, and in urging the interested citizens of the community to add one more special day or week to an already overcrowded calendar. Newspaper articles, radio spot announcements, and safety proclamations have flowed from health departments in an almost endless stream in some areas of this country. Is it not fair to ask at this point whether these are the things which actually prevent accidents? Is it not candid to ask if anyone has even attempted to determine just which of these efforts do actually change human behavior toward safer living?
>
> " * * * we have overlooked some of the fundamental precepts upon which the very profession of public health is founded * * *. The gains made against most of the major health conditions—where public health has been successful—have been through activities of a more basic educational nature. Much of the education has been on a person-to-person, face-to-face basis, and has been possible only after the public health worker has gained the personal confidence and understanding of the individual and family with whom he or she is working. It would seem that this type of program holds the greatest promise and perhaps constitutes another of the unique contributions which public health may make to the safety movement.[1]

Witnesses at the committee hearings also indicated the inadequacy of the advertising approach in solving the problem. For example, Miss Kathleen Fox of the Long Beach City Health Department, stated that "so often people say 'why don't you educate through the newspapers, through pamphlets, posters, films?' These, however, are only supplements. I could pass out to each one of you a pamphlet on what a better breakfast is, but tomorrow morning you may not eat a better breakfast. I have only sensitized you to a problem, and education, if it is to be a well rounded educational program, needs more motivating factors. I have to change your attitudes and your habits as well as increase your knowledge."

Witnesses indicated that public health departments have the epidemiological knowledge, the personnel, access to the home and the community, and the professional skills and abilities necessary to effect control and prevention methods. Program inadequacies have in large part been due to the lack of information necessary for utilizing the tradi-

[1] *American Journal of Public Health*, Vol. 47, March, 1957, pp. 338-39.

tional public health tools found successful in tackling other public health problems.

Now, however, as a result of the Home Safety Project study, much of the needed information is available. Means have been found for collecting additional data on a continuing basis. The need now is to put this information and these tools to work in California. The *Final Report* of the Home Safety Project concluded that:

> "There is no doubt that the appalling number of home and neighborhood accidents can be greatly reduced. With the concept being accepted that they are *not* inevitable, with the realization that such accidents are now a major public health problem, and with the development of practical methods to obtain the information needed for prevention programs, there remains only the initiation of organized programs throughout the State to effect a great and significant reduction in the home and neighborhood accident rate."

Representatives of local health departments and such agencies and organizations as the National Safety Council, parents organizations, and the League of California Cities recommended that a specific program be established within the State Department of Public Health. They expressed their support of a program such as has been suggested by the department where a separate agency within the department would perform the following functions:

1. Stimulate and assist local health departments to collect data on the prevalence and incidence of accidents in their areas.
2. Maintain continued surveillance of the problem throughout the State.
3. Carry on pilot programs in order to demonstrate effective ways of attacking various types of accidents.
4. Set up training programs for state and local health department personnel.
5. Stimulate schools of higher learning, such as schools of public health, public administration, architecture, medicine, engineering, and teacher training, to include training in accident prevention as a part of the regular curriculum.
6. Stimulate and supervise further research in social, physical, emotional, and environmental factors relating to accidents.
7. Serve as information resource to other state agencies and organizations.
8. Work with manufacturers and merchandisers to improve the safety of all devices, furnishings and chemicals brought into the home.
9. Work to clarify and improve legislation which bears upon the home accident situation.
10. Keep the general public informed of the extent of the home accident problem in California.

Because home accident prevention involves the consideration of psychological, physiological, social, economic and environmental factors which combine to cause accidents, any prevention program requires the skills of a broad spectrum of public health disciplines. It requires par-

ticipation by public health nurses, health educators, sanitarians and others.

For these reasons, and because of the wealth of information now available, the committee feels that, rather than creating a new agency in the department, accident prevention activities should be integrated into existing department programs and activities. It feels that the department should continue and increase its present activities and that its activities should include, but not be limited to the following:

a. The collecting, co-ordination and correlation of off-the-job accident data using the tools developed by the department and the California Home Safety Project.
b. The dissemination of accident data to local health agencies, community and other organizations for utilization in their prevention programs.
c. The encouragement of and consultation and advice to local health departments in establishing local prevention programs.
d. Continuing co-operation and co-ordination with such organizations as the National Institutes of Health and the National Safety Council in the development of home accident prevention activities.

This committee feels that these activities can be undertaken by the department with its existing personnel and without the establishment of a new agency. Co-ordination of interdepartmental activities can, it feels, be achieved as it has been in other states and in several local health departments, through, for example, a committee composed of a member of the staff of each of those bureaus or divisions with a responsibility in accident prevention, or by some other method which could best be determined by the department.[1]

During the course of its study, the committee found that there are several specific types of accident which require particular attention. These are discussed briefly in the following sections.

POISONS AND HAZARDOUS CHEMICALS

Of all accidents, poisoning from common household agents seems most amenable to prevention. Even so, 35 California children under the age of 5 died as the result of swallowing poisons during 1957. An estimated 23,340 children under the age of 5 were victims of accidental poisonings last year, according to the State Clearing House on Poison Control, California State Department of Public Health. Approximately 1,460 of these children were hospitalized.[2]

The California Home Safety Project found in its study of nontransport fatalities that "*the accident type ingesting*" accounted for 7 percent (224) of all nontransport deaths. Approximately 86 percent of these were attributed to the ingestion of medicine. Other specified objects associated with deaths from *ingesting* included household cleaning substances, insecticides, other poisonous substances, food, paint thinner, kerosene, and broken glass. Sixteen children, 3 years of age, died from ingesting compounds such as aspirin, antihistamine drugs, alcohol, kerosene, industrial solvents, Hexol, and arsenic.

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[1] A summary of the programs of other states may be found in Appendix 1.
[2] *California's Health*, State Department of Public Health, June 1, 1958.

Floyd Heffron, Executive Secretary, California State Board of Pharmacy, reported to the committee at its November 19, 1957, hearing that since January 1, 1956, 32 percent or 230 persons out of a total of 723 persons treated at the emergency hospitals of the City and County of San Francisco were treated for overdoses or accidental ingestion of aspirin tablets. Seventy-seven cases or about 11 percent, were treated for the ingestion of mothballs, detergents, cosmetics, hairoils, glue, perfume, kerosene, paint thinner, laxatives, shoe polish, camphorated oil, boric acid, Lysol, or rubbing alcohol.

A study of accidental poisoning in children was conducted by the Alameda Contra Costa Medical Association during 1957 and 1958. Data collected from hospitals in the two counties represent 90 percent or more of the cases receiving medical treatment in the area.[1] Some representative nondrug substances reported in this survey were:

Item	*Number cases involved*
Ant poisons	132
Bleaching compounds	30
Drain opener and other caustics	13
Gasoline	4
Kerosene	22
Lighter fluid and charcoal starter	20
Moth repellants	24
Paints	10
Paint thinner	48
Rodent poison	20
Solvents (not otherwise identified)	11
Turpentine	14

Information from this survey also indicated the need for focusing preventive activities toward particular age groups. The following table shows that over 80 percent of the children treated were between one and four years of age.

Cases according to age:

Under 1 year	58	(3.1%)
1-2 years	424	(22.8%)
2-3 years	748	(40.5%)
3-4 years	341	(18.4%)
4-5 years	141	(7.5%)
5-9 years	95	(5.1%)
10-14 years	45	(2.4%)

Each year thousands of new products are developed and marketed for use in the home or on the farm and in industry, and many of these create a serious home accident problem. The Committee on Toxicology of the American Medical Association has, for example, stated that an estimated 70,000 preparations are or have been marketed as cosmetics, a comparatively small class of chemical products. It has been further estimated that as high as 1,000 to 2,000 new cosmetic products appear each month, many of which disappear shortly thereafter.[2]

There are a great many provisions in the California codes concerning the marking or labeling of harmful substances; however, a majority of

[1] The study covered the period 1/1/57-11/13/57, 317 days.
Total cases: 1,854 (or 5.85 per day).
Total population covered: approximately 1,300,000 (1/11th of the State).
Child population covered: approximately 260,000.

[2] Bernard E. Conley, Ph.D. "Principles for Precautionary Labeling of Hazardous Chemicals," *Journal of the American Medical Association*, Vol. 166, No. 17, April 26, 1958, p. 2154.

these provisions relate to labeling to show weights and measures or ingredients for purposes other than warning of the presence of contents that could be injurious if swallowed. Included in that group are provisions for labeling petroleum products (Business and Professions Code, Sec. 20840, et seq.), flammable solvents (Health and Safety Code, Sec. 13118), and the ingredients in foods generally as covered in the Agricultural and Health and Safety Codes.[1]

In the State, four different agencies have jurisdiction over the labeling requirements for different classes of products: the Bureau of Food and Drug Inspections in the Department of Public Health, the Division of Industrial Safety in the Department of Industrial Relations, the Bureau of Chemistry in the Department of Agriculture, and the Board of Pharmacy in the Department of Professional and Vocational Standards.

At the federal level, label laws for drugs, pesticides and certain caustic and corrosive substances and narcotics are contained in the Food, Drug and Cosmetic Act of 1938, the federal Caustic Poisons Act of 1927, and the federal Insecticide, Fungicide and Rodenticide Act of 1947. A recent article in the *Journal of the American Medical Association* stated that "there are no federal laws for the precautionary labeling of industrial chemicals, household chemicals or poisons, although regulations for the packaging and labeling of dangerous chemicals and explosives in transit by land or water or via the mails are issued by the Interstate Commerce Commission and the Post Office Department." [2]

Apparently, a substantial number of packaged chemicals are not now required by either federal or state law, to identify hazardous ingredients on their labels, or to warn users of the dangers of overuse or misuse. The need for adequate labeling laws is the greatest for hazardous substances in household products and caustic substances. The latter are subject to regulation in 25 states. Hazardous substances in household products are subject to regulation in New York, Indiana, Connecticut, and Kansas.[3] Table 4 shows the variation in labeling requirements in different states.

The need for adequate labeling is at least twofold: one, to inform the consumer of the toxic nature of the substance, and to warn parents that the products are capable of harm and should therefore be kept out of the reach of children; and, two, to provide the medical profession with information as to the toxic ingredients in substances which have perhaps been ingested so that proper antidotes may be prescribed.

A related problem is that, even on those substances which now require labeling, the warning label is oftentimes affixed to the product in so inconspicuous a fashion that it is of little or no value. Existing label laws could be improved and uniformity achieved by designation of definitions for use of certain "flag" terms such as: "*danger*," "*caution*," "*flammable*," "*poison*," etc., so that all would correspond to the same standard. Also, the placement of labels on retail products and uniform requirements regarding print size and color would be desirable.

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[1] See Appendix 2 for Analysis of Laws Relating to Warning Labels on Poisons, Drugs and Other Harmful Substances.

[2] Conley, *Journal of the American Medical Association*, April 26, 1958, p. 2154.

[3] Bernard E. Conley, "A Uniform Chemical Label Law," *Journal of the American Pharmaceutical Association*, September, 1957, p. 536.

Table 4

TABLE OF STATE LABELING LAWS AND REGULATIONS FOR HOUSEHOLD CHEMICALS OTHER THAN PESTICIDES

	Poison Law	*Pharmacy Poison Law*	*Caustic Law*	*Household and/or industrial chemicals*
Alabama	X		X	
Arizona		X	X	
Arkansas	X			
California		X		X
Colorado		X	X	
Connecticut		X		X *
Delaware			X	
District of Columbia		X		
Florida	X		X	
Georgia	X			
Idaho		X		
Illinois	X			X
Indiana				X †
Iowa	X			
Kansas			X	X
Kentucky	X			
Louisiana			X	
Maine		X		
Maryland	X		X	
Massachusetts	X		X	X
Michigan	X			
Minnesota		X	X	
Mississippi	X		X	
Missouri		X		
Montana		X		
Nebraska		X		
Nevada	X		X	
New Hampshire			X	
New Jersey		X	X	X *
New Mexico	X			
New York	X		X	X *
North Carolina		X		X
North Dakota	X			
Ohio	X		X	
Oklahoma		X		
Oregon	X		X	X
Pennsylvania	X		X	
Rhode Island		X	X	
South Carolina	X		X	
South Dakota	X			
Tennessee		X		
Texas				X *
Utah		X		
Vermont		X	X	
Virginia	X		X	
Washington	X		X	
West Virginia	X		X	
Wisconsin		X	X	
Wyoming				
United States			X	

* Similar to CSMA Model Hazardous Substances Law.
† Poisons must be registered before sale.

SOURCE: Chemical Specialties Manufacturers Association, Inc. *Compilation of Labeling Laws and Regulations for Hazardous Substances.* June, 1958.

The committee feels that although precautionary labeling is not a panacea to the difficult problem of poisoning prevention, it will assist in effecting an increased public awareness of the dangers of toxic substances and will encourage careful handling and storage of these substances. A comprehensive hazardous substances labeling law would, it believes, go a long ways towards reducing the accident potential created by these substances.

Two model state acts have been proposed—one by the Committee on Toxicology of the American Medical Association and one by the Manufacturing Chemists Association in co-operation with the Chemical Specialties Manufacturers Association, the American Petroleum Institute and the National Paint, Varnish and Lacquer Association. Both of the proposed acts have merit but the committee cannot at this time recommend the enactment of either one. Questions relating to the existing state and federal laws and governmental agency responsibilities must be resolved. The committee does urge that the state work with these groups and with other state and federal agencies to the end that a comprehensive hazardous substance act may soon be enacted.

FIRES AND EXPLOSIVES

Fires and explosions are the second leading cause of death in the home and also, when transport accidents are excluded, the second leading cause of all deaths.[1] Ben Renfro, Fire Prevention Engineer for the City of Los Angeles, pointed out that "fire is probably the greatest claimer of lives in the young and very old, not only in the State of California but in the United States. Each year in the United States we lose 12,000 lives and we seriously damage or horribly disfigure some 25,000 others."[2]

Fires in dwelling units of all kinds are causing deaths and injuries which this committee feels are completely inexcusable in view of the knowledge we now have of home construction. Mr. Renfro mentioned one incident where an epidemic of fires occurred "involving tract homes built with imported plywood which had a hardening agent which failed at a very low temperature, leaving thin sheets of wood exposed in the event of fire. These thin sheets of plywood, in the homes where fires occurred, actually exploded after several minutes of exposure to the high heat."

The State Fire Marshal in response to a letter of inquiry from the committee stated that there is "a definite reluctance on the part of building officials to establish reasonable fire safety standards for dwelling occupancies, particularly the single-family dwellings. In this day and age relatively few people build, or at least design, their own home. For the most part, homes are designed and built in large tracts by subdividers and others, and the tendency is to build them as cheaply as possible, notwithstanding the degree of fire safety provided. I am of the opinion that the standards for family dwellings, whether single or multiple, should be strengthened to provide for greater fire safety.

"* * * I am inclined to feel that the present State Housing Act is not adequate to provide reasonable safety in apartment house and hotel

[1] See Table 3, p. 19.
[2] Committee Hearings, September 12, 1957.

dwellings. The fact that its provisions are antiquated makes it difficult to provide for reasonable safety even in new building construction."[1]

The committee has requested the State Fire Marshal to prepare a report on the causes of home and apartment house fires and make necessary recommendations that will strengthen fire safety provisions in the public law. The committee feels that additional study to determine whether or not legislation is needed in this field is urgently needed.

Another problem of concern to the committee as a cause of injury is the use of aerosol containers which contain a flammable solvent. These containers are being used for packaging of an increasing number of products: paints, hair sprays, bug killers, etc. Demonstrations at the public hearings indicated that these cans when, used near flames, become dangerous "flamethrowers." In order to minimize the potential hazards the committee is introducing legislation which will require warning labels on those containers used for the packaging of flammable substances.

Fireworks and Firecrackers

Regulations relating to the manufacture, transport, sale, and discharge of fireworks and firecrackers are contained in the Health and Safety Code (Sec. 12500 et seq). They declare that it is illegal to manufacture, transport, store or discharge fireworks without a permit from the State Fire Marshal or an officer appointed by him. Granting of such a permit shall be conditional on the applicants meeting standards that insure the health and safety of the public.

Assembly Bill No. 61, 1957 General Session, which was referred to this committee for study, would have exempted the use or discharge of certain firecrackers in religious ceremonies in a *city and county* from the licensing requirements of the State Fireworks Law, although reasonable safeguards could have been prescribed by the State Fire Marshal.

Part of the celebration of the Chinese New Year, both religiously and traditionally, includes the discharge of firecrackers. The noise produced by the explosions is claimed to ward off, both actually and symbolically, evil spirits. It was felt by some that San Francisco City and County imposed prohibitions against the use of firecrackers were preventing the Chinese community there from observing an integral part of this religious ceremony and infringing on their rights of freedom of religion.

Two major Chinese communities in California are located in San Francisco and Los Angeles. Both communities celebrate the Chinese New Year, a religious holiday. The celebration generally lasts for one week. On at least the first and last day of this week, firecrackers are set off as part of the ceremony. Although there is some disagreement as to whether there is religious significance to the use of firecrackers during these ceremonies, it is generally recognized that their use has become a traditional part of the celebration.

Testimony before the subcommittee indicated that the Chinese community in Los Angeles were not finding it difficult to adopt its traditional ceremony to fire and safety regulations enforced by the state or

[1] Letter to committee, January 6, 1959.

through local ordinances. Although the use of firecrackers was limited to certain hours of the day and to certain sections of the "Chinatown," there were no indications that the Chinese felt their religious rights were being infringed upon.

Representatives of the San Francisco Chinatown maintained that the city and county police and fire departments were restricting their celebration to such a degree, allowing the use of firecrackers for only two half-hour periods during the week's celebration, that the practice of their religion or traditions was threatened. The Chinese representatives admitted that completely unlicensed use of firecrackers would present a danger to the safety of individuals and the community, but that extending their use to conform to practice in other parts of the State would not present an added danger.

Representatives of the police and fire departments of the City and County of San Francisco held that a more lenient policy regarding firecrackers would increase the fire danger in the area and the number of accidents caused by exploding firecrackers. Residents of areas surrounding Chinatown complained that the unlimited use of firecrackers would produce an unwanted noise nuisance.

In investigating the problem statewide, the committee finds that the Chinese communities in the State as a whole have been able to conduct their religious ceremonies within the requirements of state and local regulations with very little disharmony, and in such a way as to insure adequate protection to the health and safety of the community.

Where disharmony does exist it has resulted from a conflicting definition of what constitutes adequate protection to the health and safety of the community. The committee feels that a change in the state law will not resolve this difference of opinion. It can only be resolved by discussions between the Chinese community and San Francisco city and county officials, with the hope that a reasonable compromise can be affected which will maintain the Chinese religion and traditions while providing necessary safety standards.

ABANDONED EXCAVATIONS

The so-called "Kathy Fiscus Law," found in Sections 24400-24403 of the Health and Safety Code, relates to the covering or fencing of abandoned excavations. It provides that it is a misdemeanor for any person owning land in fee simple, or in possession thereof under a lease or contract of sale, knowingly to permit the existence of any abandoned excavation, including mining shafts, pits, wells, septic tanks and cesspools, which would be dangerous either to persons legally on the premises or children under 12 years of age, and to fail to cover or fence such excavations. It authorizes the board of supervisors to order abandoned mining excavations on unoccupied public lands in the county to be covered or fenced. It requires the board to order any dangerous or unsafe excavation on unoccupied land in the county to be covered or fenced at county expense.

The measure was originally enacted to solve a specific problem which became apparent following the Kathy Fiscus incident and it relates *only* to abandoned excavations. The committee feels that the

statute as presently written is unnecessarily complicated in some instances and difficult to enforce. Further, testimony at the hearings clearly indicated that the need is for enabling legislation which will permit the local government to enact ordinances or regulations requiring the covering, fencing or other safeguarding of *any* type of excavation or artifical opening in the earth which constitutes a danger, since more children drown or are suffocated in sumps, wells, cesspools or irrigation ditches that are in operation. The committee is, therefore, recommending repeal of the present statute and the enactment of one which will more nearly meet the needs, one which will direct local governmental units to take action necessary to meet problems which are often purely local in nature.

APPENDIX 1

ADMINISTRATIVE STATUS OF STATE ACCIDENT PREVENTION PROGRAMS (ORGANIZATION, FUNDS, PERSONNEL) [1]

(November 1, 1958)

REGIONS I AND II

CONNECTICUT: Does not have a separate accident prevention unit, nor a full-time program. Functions are absorbed by: Bureau of Public Health Information; Bureau of Maternal and Child Hygiene; Bureau of Industrial Hygiene; Bureau of Laboratories; Public Health Nursing Section; Division of Cancer and Other Chronic Diseases; Bureau of Vital Statistics. A large-scale family injury survey is being conducted under a National Institutes of Health research grant of $42,000 per year. There is a full-time director for this study, with supporting staff of interviewers and secretarial help, as required.

MAINE: Does not have a formal accident prevention unit. Division of Sanitary Engineering carries on some functions. No funds are budgeted and no personnel are specifically assigned to accident prevention.

MASSACHUSETTS: Does not have a separate accident prevention unit. Functions are absorbed by the Division of Sanitary Engineering; Division of Health Information; and Division of Nursing. Activities are administratively located in the Division of Sanitary Engineering. No funds are budgeted for accident prevention. Three persons integrate accident prevention with these other programs.

NEW HAMPSHIRE: Does not have a separate accident prevention unit. Functions are absorbed by: Division of Vital Statistics; Division of Public Health Nurses; Division of Maternal and Child Health; Division of Health Education; and Communicable Disease Program. No one discipline has been assigned administrative responsibility for the program. No funds are budgeted for accident prevention.

RHODE ISLAND: Does not have a separate accident prevention unit. The Chief of Health Education directs such incidental activities as have developed. No funds are assigned to the program; no personnel are assigned to the program.

VERMONT: Does not have a separate accident prevention unit; does not have funds for establishment of one.

DELAWARE: Has established a program through the Crippled Children's Service of the Division of Maternal and Child Health. Some functions are absorbed by the Division of Public Health Nursing and the Division of Public Health Education. Amount of funds are not known. One health educator devotes full time to program.

NEW JERSEY: Does not have an accident prevention unit. Some program activities are carried on by the Maternal and Child Health

[1] From Department of Health, Education, and Welfare, Letter to Committee dated November 25, 1958.

Section. Budgetary plans for 1959 include accident prevention, and provision of a health educator to get the program under way. At present, only personnel giving time to the program is the program coordinator of the Maternal and Child Health Section.

NEW YORK: Does not have a separate home accident prevention unit. The informally organized Home Accident Section is placed administratively under the Division of Medical Services. Some functions are absorbed by the Bureau of Environmental Sanitation; the Maternal and Child Health Service; the Office Statistical Services and Research, the Bureau of Public Health Nursing; the Bureau of Chronic Disease and Geriatrics; the Office of Public Health Education; and the Bureau of Epidemiology and Communicable Disease Control. No records of funds allocated to the program are available. At present, no full-time personnel are assigned to the program, but the service of a full-time director has been requested. Meanwhile, the Associate Director of Medical Services and a health education consultant give part-time service to the program.

PENNSYLVANIA: Has Division of Environmental Safety, placed administratively under the Bureau of Environmental Health. Some activities are conducted by: The Division of Statistics and Records, Statistical Methods Section; the Bureau of Public Health Nursing. No record of budgeted funds is available. Professional personnel now include two sanitarians. Eight additional positions of accident prevention representatives (district) have been authorized.

REGION III

DISTRICT OF COLUMBIA: Does not have a separate accident prevention unit. While there are limited activities, no division is administratively responsible for the program. Functions are carried on by the Bureau of Foods, Bureau of Public Health Engineering; and the Section of Health Education. No funds are specifically budgeted and no personnel have been assigned to home accident prevention as a full-time activity.

KENTUCKY: Accident prevention activities are administratively placed in the Bureau of Maternal and Child Health. A child safety consultant works under the Director of Maternal and Child Health in developing the program. He is supported by a secretary and a clerk. The budget is $10,000.

MARYLAND: The Health Department had a home accident prevention unit under the Kellogg Demonstration Program which terminated in July, 1958. This was placed administratively under Environmental Hygiene. All disciplines co-operated. State funds were not appropriated for this activity for Fiscal Year 1959, so the unit has been disbanded.

NORTH CAROLINA: The home accident prevention section is placed administratively under the Division of Epidemiology. Functions are also carried on by the Vital Statistics Section and the Division of Public Health Nursing. There is no state appropriation for accident prevention. The unit staff includes a full-time health educator and

secretary, plus a part-time consultant who also serves as accident epidemiologist. The budget is $13,000.

VIRGINIA: Does not have a separate accident prevention unit. The accident prevention program is administered by the Bureau of Health Education. Functions are carried on by: the Bureau of Health Education; the Maternal and Child Health Service; and the Bureau of Sanitary Engineering. No state funds are specifically appropriated to the program; the expenditure for accident prevention activities are not known to us.

WEST VIRGINIA: Does not have a separate accident prevention unit. The Bureau of Industrial Hygiene provides consultative service. No funds are allocated to the program. No personnel are assigned to a program. Activities are minimal.

PUERTO RICO: Does not have a separate accident prevention unit. The Maternal and Child Health Section does some accident prevention work with schools. No funds nor personnel are earmarked for a program.

VIRGIN ISLANDS: Does not have any form of an accident prevention program.

REGION IV

ALABAMA: Does not have a separate accident prevention unit. Some program functions are carried on by the Division of Nursing; the Bureau of Vital Statistics; and the Bureau of Communicable Diseases. A record of expenditures is unavailable.

FLORIDA: The accident prevention program is administered by the Bureau of Special Health Services. One sanitarian is employed as a safety co-ordinator. A record of expenditures is not available. A special consultant in pediatrics and school health may also be appointed to provide leadership in a health education program for children.

GEORGIA: The accident prevention unit is one arm of Environmental Health Services. A sanitary engineer, public health nurse consultant, a health education consultant and two clerks comprise the staff. Total state appropriation for 1958 was $9,000, supplemented by private grant funds. The state participation will be greater in 1959, and in Fiscal Year 1960, the state is expected to assume full support. Functions are aided by the Divisions of Maternal and Child Health, Public Health Nursing, Mental Hygiene, and Environmental Health.

MISSISSIPPI: Does not have a separate accident prevention unit. The Director of the Division of Health Education is responsible for such activities as are now going on and as are contemplated. Expenditures are unknown; no personnel have been assigned full time.

SOUTH CAROLINA: Does not have a separate accident prevention unit. Program functions are carried on by the Division of Maternal and Child Health; the Public Health Nursing Section; the Sanitation Section; and the Bureau of Vital Statistics. The Director of Maternal and Child Health spearheads the program. Plans are under way to obtain a full-time director of accident prevention activities, but at

present no funds are available, nor have any personnel been assigned full time to the program.

TENNESSEE: An engineer was appointed co-ordinator of a home accident prevention program in January, 1958. Program functions are carried on by the Division of Public Health Nursing; Division of Sanitary Engineering; and the Division of Maternal and Child Health, Crippled Children's Services. No full-time personnel have been assigned to the program; expenditures are unknown to us.

REGION V

ILLINOIS: Does not have a separate accident prevention unit, but is currently planning development of one. Program responsibilities are administratively placed under the Health Education Bureau, the chief of which is the accident prevention co-ordinator. Program functions are carried on by the Bureau of Maternal and Child Health; the Bureau of Vital Statistics; the Division of Preventive Medicine, Bureau of Communicable Disease Control. At present, no one is employed full time for the program. Most accident prevention programs and activities in the state are being financed and supported from state and locally appropriated funds. A rough dollar estimate of total annual expenditures made by the health department for its accident prevention program is approximately $3,000.

INDIANA: Does not have a separate accident prevention unit. Program is placed administratively under the Bureau of Health Education. Program functions are carried on through the Division of Maternal and Child Health and the Division of Vital Records. No estimate of expenditures is available; no personnel have been assigned to the program full time.

MICHIGAN: Does not have a separate accident prevention unit. Program functions are carried out by the Section of Public Health Nursing; Section of Public Health Education; Section of Vital Records and Statistical Methods; Section on Maternal and Child Health; Division of Local Health Administration; Division of Occupational Health. An estimate of funds is not available; no full-time people are assigned to the program. The health officer has recommended that the state health commissioner request the legislature to provide $300,000 to develop and staff a statewide accident prevention program, stressing home and farm safety.

OHIO: Does not have a separate accident prevention unit. The accident prevention program is integrated in all divisions. The Divisions of Administration, Vital Statistics, and the Industrial Hygiene Section are specially active. Direction of the program is placed administratively in the Division of Health Education. An estimate of expenditures is not available; no full-time personnel have been assigned to the program.

WISCONSIN: Does not have a formal accident prevention unit. The program is placed administratively in the Division of Health Education; the work is integrated through the program of the Division of Public Health Nursing; the Bureau of Sanitary Engineering; the Section on Environmental Sanitation; the Section on Maternal and

Child Health; the Division of Hospital and Related Services; and the Division of Industrial Hygiene. There is no special state appropriation for the support of accident prevention programs. Films, publications, etc., are financed from the general health funds. The home safety committee is given $200 per year by the Wisconsin Safety Council. It is estimated that $2,250 is spent on special work for accident prevention annually by the State Board of Health. No people are employed full time for work on the accident prevention program.

REGION VI

IOWA: Has a formal accident prevention unit with a full-time person charged with responsibility for accident prevention activities. The program is placed administratively under the Division of Public Health Education. Program functions are carried out by the Division of Public Health Education; Division of Public Health Engineering and Industrial Hygiene; the Division of Vital Statistics; Division of Maternal and Child Health; and the Division of Public Health Nursing. No information is available on expenditures. One person has been assigned full time to the program.

MINNESOTA: Does not have a formal accident prevention unit. The program is placed administratively under the Section of Maternal and Child Health. Activities are integrated through other sections, specifically: the Section of Local Health Services; Section of Public Health Nursing; Section of Public Health Education; Division of Hospital Services; Division of Environmental Sanitation; Section of Industrial Health; Division of Engineering; and Division of Vital Statstics. No state appropriations are available, but activities receive support from outside groups. The Children's Bureau provides $7,000. No personnel are assigned full time to the program, though plans exist for hiring a health educator to co-ordinate the program.

MISSOURI: Does not have a formally organized accident prevention unit. Accident prevention activities are located in the Bureau of Health Education and the Bureau of Occupational Health, with administrative responsibility resting with the former. The program is integrated by the Section on Maternal and Child Health; Bureau of Public Health Nursing; Bureau of General Sanitary Engineering; and the Bureaus of Vital and Statistical Services and Records. No funds are allocated to the program; no full-time personnel have been assigned to the program.

NEBRASKA: Does not have a formally organized accident prevention unit. Program is placed administratively under the Division of Public Health Education. Program activities are integrated by the Section of Maternal and Child Health; the Division of Public Health Nursing; the Bureau of Vital Statistics; and the Division of Health Education. Funds being expended for accident prevention activities are moneys budgeted for health education activities. No full-time personnel are assigned to the program.

NORTH DAKOTA: Does not have a formally organized accident prevention unit. The program is located administratively in the Division of Health Education. Program activities are integrated by the Section of Mother and Child Health; Division of Vital Statistics; and

Division of Health Education. No funds are available for the program; no personnel have been assigned full time to the program.

SOUTH DAKOTA: Does not have a formal accident prevention unit. The program is placed administratively in the Division of Health Education. Program functions are aided by the Division of Maternal and Child Health and Crippled Children's Services; Division of Public Health Nursing; Division of Public Health Statistics; Section of Occupational and Radiological Health; and the Division of Sanitary Engineering. No information on funds is available. No personnel have been assigned full time to the program.

KANSAS: Does not have a formal accident prevention unit. Program is placed administratively in Health Education Services. Program is also promoted by: the Division of Maternal and Child Health; Section of Public Health Nursing Services; Division of Sanitation; Division of Vital Statistics and Records; and the Division of Hospital Facilities. All funds expended for accident prevention at the state level are from the Health Education Services budget. An estimate of the amount is not available.

REGION VII

ARKANSAS: Does not have a formal accident prevention unit. Program is placed administratively in the Division of Maternal and Child Health, which maintains a child safety program with a director assigned to the program, and a budget of $7,000. Other bureaus and divisions co-ordinate the program, notably the Division of Public Health Education and Division of Vital Statistics.

LOUISIANA: Has a formal accident prevention program, activities of which are divided administratively between the Section of Occupational Health and Safety, Division of Preventive Medicine, which is headed by an engineer, and the Maternal and Child Health Section, Division of Preventive Medicine, with the director of Maternal and Child Health directing a school and home safety program. Both phases of the program are promoted by the Public Health Education Division which has a safety director. The Division of Public Health Nursing also promotes the program. Funds for support of accident prevention are entirely from the Maternal and Child Health budget, except for incidental expenses of the engineer in occupational health. No budget is available for the latter's activities in the field. Maternal and Child Health employs a safety consultant. Five thousand dollars has been appropriated from Maternal and Child Health funds for establishment of a poison control center; $8,000 is promised for the next fiscal year.

NEW MEXICO: Has no formal accident prevention unit. Program activities are limited, but some promotion has been given by the Division of Maternal and Child Health and the Division of Health Education. No funds, nor full-time personnel have been assigned for the program.

OKLAHOMA: The accident prevention unit is located in the Division of Local Health Services. The program is promoted by the Division of Sanitary Engineering; Division of Maternal and Child Health; Division of Vital Statistics; and Division of Public Health Nursing.

Ten thousand dollars has been allocated to the program, and $2,000 more has been requested. One professional person is employed full time.

TEXAS: Though no formal accident prevention unit exists, a formal program plan for accident prevention has been developed with a Health Council Task Force which directs and co-ordinates program operations and activities. This task force is made up of the directors of: Division of Maternal and Child Health Services; Division of Public Health Nursing; Division of Public Health Education; Division of Sanitary Engineering; Division of Vital Statistics; Division of Mental Health; Division of Food and Drugs. The Division of Occupational Health also promotes the program. No money has been allocated to the program, but the various bureaus and divisions assigned to the work are spending an unknown quantity from their own budgets for the work. No full-time personnel have been hired to work on the program.

REGION VIII

COLORADO: Does not have a formal accident prevention unit. The program is located administratively in the Division of Hospital and Disease Control, the director of which is the program co-ordinator. The program is promoted by the Section of Occupational Health and the Section of Public Health Education. No funds are supplied for the program although there is a Highway Safety Council which obtained $47,000 from the state for the highway safety program. No personnel are hired specifically for the program.

IDAHO: Does not have a formal accident prevention unit. Some activities are promoted by the Health Education Service; Section of Engineering and Sanitation; and the Vital Statistics Service. No key person is responsible for the program. No state appropriations have been allocated to the program. No personnel have been hired for the program.

MONTANA: Does not have a formal accident prevention unit. A committee co-ordinates and promotes a program. Program functions are carried out by the Child Health Services; Narcotics Education Service; and the Division of Records and Statistics. No funds have been allocated to the program. No personnel have been hired for the program.

UTAH: Does not have a formal accident prevention unit. Administratively, the program is placed in the Division of Public Health Education, the director of which is the key person responsible for accident prevention. The program is promoted by the Division of Public Health Nursing; Division of Records and Statistics; and the Division of Sanitary Engineering. About $500 from general funds are used for accident prevention activities ($200 for a poison control center, and $300 for literature and publicity.) No full-time personnel have been hired for the program.

WYOMING: Does not have a formal accident prevention unit. Activities are administratively placed in the Division of Health Education, the director of which is the person charged with responsibility for the program. The program is also promoted by the Division of Public Health Nursing and the Section on Industrial Hygiene. No state appropriations are designated for accident prevention. However, 5

percent of the Health Education funds are allocated to accident prevention. No personnel have been hired for the program.

REGION IX

ARIZONA: Does not have a formal accident prevention unit. Administratively, accident prevention is placed in the Division of Health Education. Activities are also promoted by the Division of Mental Health and the Bureau of Sanitation. No funds are available for a program. No personnel have been hired for a program.

NEVADA: Does not have a formal accident prevention unit. Administratively the program is placed in the Office of Health Education. Some program functions are carried on, too, by the Division of Public Health Nursing Services; Division of Vital Statistics and Personnel Administration; and the Division of Public Health Engineering. An estimate of expenditures is unavailable. No personnel have been hired for a program.

OREGON: Does not have a formal accident prevention unit. The program is placed administratively in the Section of Health Education. One health educator has responsibility for accident prevention in the state, along with other duties. No state funds are available at present, but $17,490 is budgeted for the next biennium for continuation of the former Home Safety Demonstration Project.

WASHINGTON: Does not have a formal accident prevention unit. Activities are placed administratively in the Section of Maternal and Child Health. Some activity is promoted by the Division of Nursing and the Section of Health Education. Expenditures are unknown. No full-time personnel have been hired, but one health educator works part time on the program.

APPENDIX 2

STATE OF CALIFORNIA
OFFICE OF LEGISLATIVE COUNSEL
SACRAMENTO, CALIFORNIA, October 3, 1957

ANALYSIS OF LAWS RELATING TO WARNING LABELS ON POISONS, DRUGS AND OTHER HARMFUL SUBSTANCES

A search of the California Codes has revealed a great many provisions concerning the marking or labeling of substances that could be harmful to children. However, a majority of these provisions relate to labeling to show weights and measures or ingredients for purposes other than warning of the presence of contents that could be injurious if swallowed by a child. Included in that group are provisions for labeling petroleum products (B. & P. C. Sec. 20840 et seq), flammable solvents (H. & S. C. Sec. 13118), beer (B. & P. C. Sec. 25200 et seq), and the ingredients in foods generally as covered in the Agricultural and Health and Safety Codes.

Accordingly, we have restricted this analysis to a discussion of those provisions in the law that might actually provide for a warning of a substance as to which special care should be taken to keep it out of a child's reach.

1. Poisons

Provisions relating to the labeling of poisons are found in Article 7 (commencing at Section 4160), Chapter 9, Division 2 of the Business and Professions Code. Poisons are defined by enumeration under Schedules "A," "B," and "C" in Section 4160 of the Business and Professions Code. Before any person vends, sells, gives away or furnishes, either directly or indirectly, any of those poisons a poison label must be affixed to containers of "A" and "B" schedule poisons and a caution label affixed to the container of a "C" schedule poison (B. & P. C. Sec. 4161).

The poison label must contain the word "poison" and the "vignette" representing the skull and crossbones in red letters on white paper or in white letters on red paper; it shall have the name of the contents and the name and place of business of the packaging firm; it shall have the antidote (and no other) approved by the Board of Pharmacy (B. & P. C. Sec. 4168). The label must be in English (B. & P. C. Sec. 4169).

The Board of Pharmacy may add or deduct from the list of poisons (B. & P. C. Sec. 4176). Additions to the "C" schedule are found in Section 1746 of Title 16 of the California Administrative Code.* The poisons added and the form of the caution label for each, giving warning of the particular dangerous characteristic, is described therein.

* Schedule "C" additions in the Administrative Code are:
a. Carbon tetrachloride;
b. Xylene;
c. Acetone;
d. Benzol;
e. Toluene.

In addition to labeling, no sale or delivery of a poison on the "A" schedule or one so designated by the Board of Pharmacy may be made without informing the person desiring it of its poisonous nature (B. & P. C. Sec. 4162). Nor may poison on the "A" and "B" schedules be sold or delivered to any person under 18 years of age (B. & P. C. Sec. 4164).

Expressly exempted from these labeling provisions are the prescriptions of a practicing physician, dentist, chiropodist or veterinary surgeon (B. & P. C. Sec. 4173), the sale of denatured alcohol for external use (B. & P. C. Sec. 4174) and fluorides used in dentifrices if below a specified percentage (16 Cal. Adm. C. Sec. 1748).

2. *Dangerous Drugs*

Provisions concerning dangerous drugs are found in Article 8 (commencing at Section 4210), Chapter 9, Division 2 of the Business and Professions Code.

Dangerous drugs are defined as meaning any drug unsafe for self-medication and specifically including those drugs enumerated in Section 4211 of the Business and Professions Code with the exception of certain drugs used in animal preparations and so labeled (B. & P. C. Sec. 4211). In addition the Board of Pharmacy, after notice and hearing, may make further rules limiting or restricting the furnishing of any drug found to be dangerous (B. & P. C. Sec. 4240).

No person shall dispense any dangerous drug except upon the prescription of a physician, dentist, chiropodist or veterinarian (B. & P. C. Sec. 4227). The prescription label must contain the date, name and address and prescription number of the furnisher, names of prescriber and person for whom prescribed, and directions for use given by the prescriber (B. & P. C. Sec. 4228). No provision requires a warning or caution label on prescriptions.

Additions to the dangerous drug list by the Board of Pharmacy are found in Article 6 (commencing with Section 1744), Chapter 17, Title 16 of the Administrative Code. Penicillin and estrogenic and androgenic substances are added (16 Cal. Adm. C. Secs. 1744 and 1747).

Provisions concerning drugs in general, whether considered dangerous or not, are found in Chapter 2 (commencing with Section 26200) of Division 21 of the Health and Safety Code.

A drug is declared to be misbranded and appropriate penalties will be applied (H. & S.C. Sec. 26280 et seq) unless a label affixed to the immediate container of an article (H. & S. C. Sec. 26204) contains the following matter:

(a) Adequate directions for use if necessary for the public health;

(b) Warnings against use by persons with a pathological condition or children where its use may be dangerous to health;

(c) Warnings against unsafe dosages or methods of administration (H. & S. C. Sec. 26244).

(d) Designated solely by the name recognized in an official compendium or the common name of drugs contained, active ingredients

if it contains more than one, and any inclusion of certain enumerated drugs * (H. & S. C. Sec. 26243).

(e) A statement of precautions to be taken if the drug is of a type liable to deterioration (H. & S. C. Sec. 26247).

Unless specifically designated as a dangerous drug no warning or caution label in addition to the above is required.

Exempted from the requirements concerning drugs are drugs sold on prescription of a member of the medical, dental or veterinary profession if the drug bears a label containing the name and place of business of the seller, serial number and date of the prescription, name of person for whom prescribed, the name of the person by whom prescribed and directions for use as prescribed (H. & S. C. Sec. 26252).

The special classification of those drugs known as narcotics are, in general, regulated by Division 10 (commencing with Section 11000) of the Health and Safety Code. Narcotics are those drugs specifically enumerated in Section 11001 of the Health and Saftey Code and such additions as made by the Chief of the Division of Narcotic Enforcement in accordance with Section 11002.1 of the Health and Safety Code.

Wholesale dealers and pharmacists must affix to the original container of every narcotic a poison label (B. & P. C. Sec. 4171). A drug that contains a narcotic must carry a statement on the label of the quantity and the statement "Warning—may be habit forming" (H. & S. C. Sec. 26254).

If a narcotic is used in a drug provided under a prescription no label other than the prescription is required. Such prescription shall contain the name and address of the dispenser, the serial number and date of the prescriber, name of patient, directions for use and any cautionary statements in the prescription (H. & S. C. Sec. 26255).

3. Economic Poisons

Sprays, dusts, repellants and similar substances that are used to control, destroy or repel insects, fungi, weeds or any other plant or animal life are controlled by the provisions of Article 3 (commencing with Section 1061) of Chapter 7 of Division 5 of the Agricultural Code.

When there is an ingredient highly toxic to man the label must state the name and the percentage of each active ingredient (Ag. C. Sec. 1064).

4. Livestock Remedies

Effective January 1, 1958, livestock remedies will be regulated by Chapter 7b (commencing with Section 1095) of Division 5 of the Agricultural Code. After that date this chapter will control livestock remedies even though they contain "dangerous drugs" within the meaning of the Business and Professions Code.

Under the livestock remedy law all remedies must be labeled, in bold face type in a conspicuous place, with the words "livestock remedy—not for human use." If it is sold in such form that it might be administered to humans, the label should have the words "hazardous remedy"

* Drugs enumerated in Section 26243 of the Health and Safety Code are: Bromides, ether, chloroform, acetanilid, acetphenetidin, antipyrine, atropine, hyoscine, hyoscyamine, codeine, arsenic, digitalis, digitalis glucosides, mercury, ouabain, strophanthin, strychnine, barbituric acid, or any derivative or preparation of any such substance.

in conspicuous letters. In addition the label must have adequate warnings against improper use and the name of each active drug ingredient (Ag. C. Sec. 1096.3).

5. Federal Law

Like state law, the Federal Food, Drug and Cosmetic Act (21 U. S. C. Sec. 301 et seq) is largely concerned with labeling as a method of maintaining purity. Those provisions providing for a warning label relate to drugs. Any drug containing a narcotic or hypnotic substance must carry the label "warning—may be habit forming;" there must be adequate directions for use of any drug and adequate warnings against use in those pathological conditions or children where its use may be dangerous to health or against unsafe dosage or application; if a drug purports to be a drug recognized in an official compendium it must be labeled and packaged as prescribed therein; a statement of precaution must be made if the drug is of a deteriorative nature (21 U. S. C. Sec. 352). A prescription, with certain exceptions, is exempted from general labeling requirements. The prescription label must contain the name and address of the dispenser, serial number and date of the prescription, name of prescriber, name of patient and directions for use and cautionary statements, if any, contained in the prescription (21 U. S. C. Sec. 353).

Very truly yours,

RALPH N. KLEPS
Legislative Counsel

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ASSEMBLY INTERIM COMMITTEE REPORTS
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AIR POLLUTION ITS HEALTH EFFECTS AND ITS CONTROL

A Report of the

ASSEMBLY INTERIM COMMITTEE
ON PUBLIC HEALTH

SUBCOMMITTEE ON AIR POLLUTION AND RADIATION PROTECTION

House Resolution No. 219, 1957

Report Prepared by
EDWARD LEVY

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March, 1959

Published by the
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LETTER OF TRANSMITTAL

ASSEMBLY CHAMBER, STATE CAPITOL
SACRAMENTO, March 3, 1959

Hon. Ralph M. Brown
Speaker of the Assembly, and
Members of the Assembly
Assembly Chamber, Sacramento

GENTLEMEN: The Assembly Interim Committee on Public Health submits its report on air pollution in California prepared by the Subcommittee on Air Pollution and Radiation Protection in accordance with House Resolution No. 219 of the 1957 Session.

Respectfully submitted,

W. BYRON RUMFORD, Chairman
Assembly Interim Committee
on Public Health

SUBCOMMITTEE LETTER OF TRANSMITTAL

ASSEMBLY CHAMBER, STATE CAPITOL
SACRAMENTO, March 3, 1959

HON. W. BYRON RUMFORD, *Chairman*
Assembly Interim Committee on Public Health

DEAR MR. RUMFORD: Enclosed is the report on air pollution in California prepared by the Subcommittee on Air Pollution and Radiation Protection. The subcommittee held public hearings on this subject as follows:

October 28, 1958, Los Angeles.
November 12, 1958, Berkeley.

The subcommittee found that air pollution was remaining a serious problem in the State's two largest metropolitan areas and was a growing problem in other areas of the State, largely because of the State's rapid growth in population, industry and motor vehicle use. The subcommittee has come to recognize that the continued presence of air pollution represents a health hazard to the people of the State, one that could result in widespread sickness and death. The exact nature of this hazard has yet to be determined, although some research work to this end is in progress. The subcommittee feels that the recommendations advanced in this report, if acted upon, will provide more information on this problem.

The subcommittee wishes to express its appreciation to the many witnesses who appeared before it, to the staff of the Los Angeles Air Pollution Control District and the Bay Area Air Pollution Control District, and the Department of Public Health for their valuable assistance, and to the California Legislative Internship Program for making available to the subcommittee the services of Mr. Edward Levy.

Respectfully submitted,

SETH J. JOHNSON, Chairman
Subcommittee on Air Pollution
and Radiation Protection
RICHARD T. HANNA
W. BYRON RUMFORD
W. S. GRANT
DON MULFORD

FINDINGS

1. Air pollution remains a critical problem in the State's two largest metropolitan areas, and is an increasing one in other areas of the State, notably the Central Valley.
2. There is still insufficient data on what the specific components of smog are, and what is the chemical interaction between these components that produce the irritating effects common to smog. This lack in our knowledge of air pollution constituents has hindered the establishment of safe air standards.
3. Research into the health effects of air pollution has still not progressed far enough to determine the pathological effects of low-level concentrations of air pollution. While California smog has, if given the right conditions, the disaster potential of the London, England, and Donora, Pennsylvania, fogs, the long-run effect of low-level smog might be equally catastrophic.
4. There is insufficient systematic information gathered on the growth of the air pollution problem in the Central Valley and the fringe areas. This lack of information has hindered local governments in these areas in taking effective action to control air pollution during its early stages.
5. Exhaust from automobile and diesel engines is the only major known, uncontrollable source of air pollution. Without the control of this source further progress in the elimination of air pollution in the Los Angeles area will be minimal. In other parts of the State, as other sources of pollution are controlled, automobile and diesel engine exhaust will become the major contributor to air pollution.
6. When an effective, commercial automobile exhaust control mechanism is developed and installed on automobiles, it will be necessary to have a state inspection system to check periodically on the operational condition of the devices.

RECOMMENDATIONS

1. That there be an increase in the research program carried on by the Department of Public Health to determine what the irritants in California air pollution are and what pathological effect they have on animal tissue.
2. That the Department of Public Health be directed to determine what constituted safe or acceptable air, and that they establish standards of safe air. That sufficient funds be appropriated to establish adequate laboratory facilities for this purpose.
3. That the Advisory Committee on Motor Vehicle Legislation, and representatives of the Department of Motor Vehicles, the California Highway Patrol, the Department of Public Health, and the Motor Vehicle Exhaust Products Committee of the Automobile Manufacturers Association, determine the steps necessary to establish a system for the inspection of motor vehicle exhaust control devices once such devices are perfected. This advisory committee shall report its findings to the Legislature and the Assembly Interim Committee on Transportation and Commerce by January 1, 1961.
4. That the Federal Government increase its expenditures and expand its program of research into the health and medical effects of air pollution. That the U. S. Public Health Service continue its sponsorship and support of the National Air Pollution Conference.
5. That the statewide air pollution monitoring system be expanded to provide more complete information on the growth of the air pollution problem.

PROPOSED LEGISLATION

HOUSE RESOLUTION NO. 32

By Messrs. Johnson, Rumford, Grant, Hanna and Mulford:

Relating to air pollution by motor vehicles

WHEREAS, Air pollution is a hazard to the health of the people of the State; and

WHEREAS, Emissions from motor vehicle exhausts are the only presently uncontrollable major source of air pollution; and

WHEREAS, The motor vehicle population of this State has increased from 5,823,981 in September, 1953, to 7,454,832 in September, 1958, and is still rapidly increasing; and

WHEREAS, The motor vehicle is an existing, increasing, and major contributor to air pollution in an ever greater number of communities; and

WHEREAS, The motor vehicle as a moving source of air pollution does not operate solely within a single local or state governmental jurisdiction, and therefore the primary responsibility for the abatement of this source is the manufacturer of the motor vehicle; and

WHEREAS, Only one million dollars a year is being expended by the motor vehicle manufacturers of the United States, and an equally insufficient amount of time and energy are being devoted to this problem by the motor vehicle manufacturers; now, therefore, be it

Resolved by the Assembly of the State of California, That the motor vehicle manufacturers of the United States be requested to expedite research on a motor vehicle exhaust control mechanism before legislation to protect the people from the public health menace becomes necessary; and be it further

Resolved, That the motor vehicle manufacturing industry of the United States is called upon to report to the Nation and to the State of California as soon as possible on its constructive accomplishments to date, the work now under way, and the work planned, including a time schedule and a date when an effective motor vehicle exhaust control device will be available; and be it further

Resolved, That the Chief Clerk of the Assembly be hereby directed to transmit copies of this resolution to the Automobile Manufacturers Association in Detroit, Michigan.

Resolution read, and referred to the Committee on Rules.

HOUSE RESOLUTION NO. 131

By Messrs. Johnson, Rumford, Grant, Hanna, Mulford:

Relative to Air Pollution.

WHEREAS, Air pollution is presently a hazard to the health of the people of this State; and

WHEREAS, The control of automobile exhaust products is an essential part of any plan to solve the air pollution problem; now, therefore, be it

Resolved by the Assembly of the State of California, That the Advisory Committee on Motor Vehicle Legislation, with representatives of the Department of Motor Vehicles, the California Highway Patrol, the Department of Public Health, the Motor Vehicle Exhaust Products Committee of the Automobile Manufacturers Association, and the air pollution control districts, is authorized and directed to ascertain, study, and analyze all facts relating to the control of motor vehicle exhaust products, including but not limited to the operation, effect, administration, enforcement and needed revision of any and all laws bearing upon the subject of this resolution, and including a study of the administrative, legislative, and inspection problems, and to report thereon to the Assembly Interim Committee on Transportation and Commerce and to the Legislature by January 1, 1961, including in the report its recommendations for legislation.

AIR POLLUTION

Its Health Effects and Its Control

I. THE SCOPE OF THE PROBLEM

Air pollution in California continues to be a serious and increasing problem. More time, money and effort are being expended on air pollution than at any previous time in our history. Yet the problem continues to grow.

Air pollution levels in metropolitan areas in California during 1958 were nearly as high as any previous year during which measurements of air pollution were taken; in several other areas they were higher than ever before.

In the Bay area, oxidants were high on nine days during September and October, 1958.[1] Visibility was frequently restricted and eye irritation occurred over much of the area from September through December. These months in the Bay area were very similar to September and November, 1956, when intense smog attacks were recorded. (See Figure I.) San Diego and Riverside also recorded high air pollution and oxidant values in the fall of 1958.

The Los Angeles Air Pollution Control District called seven smog alerts during 1958, as compared to one in 1957 and 10 in 1956.[2] This continued need to call alerts in Los Angeles demonstrates a lack of progress in controlling some sources of air pollution. (See Figure II.)

One of the most significant findings was that oxidant values in Central Valley communities were also high. In the City of Sacramento high oxidants on several days were associated with reduced visibility and reports of eye irritation. These were the first reports of eye irritation attributed to smog in the Central Valley.

Mr. John Maga, Chief of the Bureau of Air Sanitation, pointed out that workers from the University of California at Riverside "have found evidence of vegetation damage due to smog. * * * in Kern County in 1956 and in most of the San Joaquin Valley counties in

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[1] Air pollution levels are determined in most automatically equipped monitoring stations by measuring four compounds found in polluted air. These are:

(a) Oxidants, measured in parts per million parts of air (ppm). Concentrations of oxidants are measured by forcing air through a potassium iodide (KI) solution which changes color in the presence of oxidants. The degree of color change indicates the concentration of the pollutants. In areas where manual oxidant samplings are made, measurements are taken using a phenolphthalin solution. The readings obtained from these two methods do not exactly correspond to one another, but may be approximately converted using the formula X ppm. (KI) $\times$ 1.7 = Y ppm. (phen).

(b) Carbon monoxide (CO) reported as parts per million parts of air by volume.

(c) Sulfur dioxide (SO_2) reported as parts per million parts of air by volume.

(d) Oxides of nitrogen ($NO+NO_2$) reported as parts per million parts of air by volume. In addition, measurements are taken of particulate matter in air. After collecting the particulate matter on a filter paper, the amount present is determined by measuring the degree of loss in transmission of light through the filter paper. This loss is expressed in COH units.

[2] In Los Angeles an alert is called when ozone, carbon monoxide, sulfur dioxide, or nitrogen oxides reach predetermined levels. So far only first stage ozone alerts, when ozone reaches .5 ppm (KI), have been called. A further discussion of the alert system may be found in: California State Assembly, "Air Pollution and the Public Health," Report of the Assembly Interim Committee on Public Health, Subcommittee on the Health Effects of Smog. Volume 9, Number 11 (March 20, 1957) pp. 19-20.

1957. While this damage was not extensive, it is an indication of the presence of smog in the valley and supports the findings of the high oxidants, and the eye irritation, and the reduced visibility that were reported from that area." [1]

Much can be learned, or inferred, about the future growth of the air pollution problem by knowing a little about the State's expected growth; where industry will develop and future automobile use.

Since meteorological conditions conducive to air pollution occur over the Central Valley areas, as they do in general over the whole State, "it is obvious that the geographic location of a community in California is not the element that determines whether it is going to have air pollution, but rather its size." [2]

Other areas of the State will experience serious air pollution as they become more densely populated. As they grow "they will discharge even more pollutants, so that the valley population centers will be the next ones that we expect to experience community-wide air pollution as we know it in our metropolitan regions." [1]

At the present time valley cities (Sacramento, Bakersfield, Fresno) the Riverside-San Bernardino area, and San Diego and Orange Counties are among the fastest developing in the State. Projected population figures for these areas indicate their continued growth for many years to come. The motor vehicle population in these areas will also continue to grow as it has in the past. Sacramento County motor vehicle registration grew from 162,069 in 1953 to 220,322 in 1958, a 36 percent growth. Kern County registration increased 16 percent in the same period.

Statewide, this population growth with its accompanying industrial development has also created additional sources of air pollution. The State's population has increased from 7,000,000 in 1940 to 14,000,000 in 1958. Los Angeles County alone increased its population between 1940 and 1950 by 1,366,044. Since that time it has been adding about 189,000 additional people to its population each year, an average of about 22 per hour. Every year it adds to the county enough people, homes and industry to equal a city the size of Pittsburgh.

Motor vehicle growth in the State has immensely added to the air pollution problem. Motor vehicle registration increased from 5,823,981 in 1953 to 7,544,832 in 1958. Projection of this figure place the number of motor vehicles operating in the State at 9,300,000 in 1963 and 11,200,000 in 1968.

As a result of the rapid increase in motor vehicle use in the State, and particularly in the metropolitan areas, gains made in controlling pollution from industrial and domestic sources have largely been offset by increased contamination from motor vehicles.

Levels of Air Pollution—1958

Five components normally measured to determine the extent of air pollution are oxidants, sulfur dioxide, carbon monoxide, nitrogen oxides, and particulate matter. Although oxidant values are popularly thought of as the best indicator of air pollution levels, they are not

[1] Testimony before the subcommittee, November 12, 1958.
[2] Testimony of John Maga, November 12, 1958.

always, by themselves, a true indication of air pollution. For example, reduced visibility and eye irritation can be experienced when oxidant levels are not unusually high.

During September and October, 1958, Berkeley experienced typical air pollution when oxidant values were well above .15 ppm. (KI), one threshold level used to define the extent of pollution. In November and early December, 1958, oxidants were below this level but there was still a marked reduction in visibility, and eye smarting was noticed. This can be accounted for in two ways:

(1) Eye irritation is not caused by oxidants. Both oxidants and eye irritation are produced by the photochemical reaction of sunlight on pollutants. Under conditions of restricted sunlight it may be possible to produce the eye irritating compounds without producing oxidants.

(2) Concentrations of smog components other than those produced in the photochemical reaction may be unusually high, while oxidant levels remain low.

Two other smog components that are important in this respect are carbon monoxide (CO), a toxic gas which in small quantities can cause headaches, and particulate matter, sometimes measured in COH units, which is capable of severely reducing visibility.

In Berkeley during September and early October, 1958, CO levels were well under 25 ppm. but reached peaks of 45 ppm. in November. COH units were also usually low, below one unit, during September and early October, but reached peaks of four units in November and December. The unusually high levels of these components, although oxidant values were low, produced the low visibility prevalent in the Bay area during November and December, 1958, and indicates the lack of adequate dilution of the air during these months.

Similar conditions prevailed in Los Angeles during part of 1958. For example, on November 24 and 25, 1958, reports of eye irritation were at a near all-time high, although oxidant readings had not reached the alert stage (.5 ppm.) (KI).

In comparing data from the last two years we find that there was one alert called in Los Angeles in 1957 and seven called in 1958. This is not, however, an adequate comparison of the two years, as it does not allow for the number of days when oxidant readings approached but did not quite reach the alert level. Another consideration when equating air pollution levels and their noticeable effects on humans and plants is that eye irritation, plant damage, and reduced visibility will occur when oxidant readings are only about .15 ppm. (KI) or .25 ppm. (phen.), well below alert level. These concentrations of oxidants may be considered threshold levels of air pollution above which physical effects are often manifest.

By comparing levels of oxidants, as measured at the California Institute of Technology, Pasadena, for 1957 and 1958, the increased severity of air pollution attacks can be better illustrated.

TABLE I

Number of days oxidants above eye irritation level (.25 ppm.) (phen)
California Institute of Technology, Pasadena

	Jan.	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept*	*Oct.*	*Nov.*	*Dec.*	*Total*
1957	1	10	11	15	15	16	12	16	13	6	0	0	115
1958	2	5	0	12	21	24	31	30	28	14	16	16	199

TABLE II

Intensity of oxidants on smoggy days

	No. of days oxidant between			
	.25-.35	*.36-.50*	*.51-above*	*Monthly high*
1957				
January	1	0	0	(.26)
February	4	5	1	(.57)
March	5	5	1	(.88)
April	6	3	6	(1.0)
May	6	2	7	(.63)
June	4	6	6	(.74)
July	6	4	2	(.75)
August	10	5	1	(.51)
September	6	4	3	(.78)
October	4	2	0	(.44)
November	0	0	0	(.20)
December	0	0	0	(.19)
1958				
January	1	1	0	(.38)
February	2	2	1	(.64)
March	0	0	0	(.20)
April	6	3	3	(.88)
May	6	7	8	(.69)
June	7	6	11	(.95)
July	2	17	12	(1.17)
August	1	11	18	(.90)
September	9	10	9	(.86)
October	3	7	4	(.70)
November	6	5	5	(.81)
December	5	8	3	(.69)

Table I indicates that the number of smoggy days at the California Institute of Technology, Pasadena, monitoring station appreciably increased during 1958. During 1958 there were 199 days on which the oxidant levels reached the .25 ppm. (phen) threshold level. There were only 115 like days in 1957.

Table II reveals that the number of high smog days (.51 ppm. or above) increased during the months of June-December, 1958, over the corresponding months in 1957. Percentages of smoggy days in this category were: June, 1957, 37 percent—June, 1958, 45 percent; July 1957, 16 percent—July, 1958, 38 percent; August, 1957, 6 percent—August, 1958, 60 percent; September, 1957, 23 percent—September, 1958, 32 percent; October, November and December, 1957, 0 percent—October, November and December, 1958, 28 percent, 31 percent, and 18 percent respectively. Percentages for these months in 1958 were appreciably higher than in 1957. A similar increase can be noted for days that oxidant levels were between .36 to .50 ppm. (phen). In all but two months in 1958, the monthly highs exceeded those in 1957.

Clean Air Standards

A question of great concern to the committee and one which has been posed many times by and to public health officials is what type of air should the air pollution control programs attempt to obtain. Basically there are three different types of "acceptable air": remote area air, rural clean air, and metropolitan clean air.

Remote area air would exist in areas far removed from industrial and major transportation centers which have a favorable meteorological situation. In such areas no contaminants would be produced

locally nor would they drift in from other areas. These conditions prevail only in high mountain areas and in the very remote sections of Northern California. The second class of acceptable air, rural clean air, exists in areas where there are some contaminants resulting from agricultural operations and limited or light industrial development or where unfavorable meteorological conditions hinder the escape of minor amounts of pollutants.

Metropolitan clean air is air that still contains substantial amounts of pollutants that enter the atmosphere of a metropolitan area in spite of an effective control program. But these contaminants would not interfere with individual comfort.

In attempting to control smog, what type of air should we strive to attain? It is likely that remote area air is unobtainable in metropolitan areas unless *every* source of pollution is controlled *completely*. This is an impossible goal at the present both economically and technically. At this time the purest air we can hope to obtain in metropolitan areas would contain contaminants somewhere below the point at which individual comfort is impaired or plant damage occurs. Although these levels have not been established at this time, approximate levels might be the following:

SO_2—.3-.5 ppm.
Oxidants—.15 ppm. (KI) or .25 ppm. (phen)
Sulfur Dioxide (SO_2)—.5 ppm.
Carbon Monoxide (CO)—25 ppm. Except for short periods of time.
Particulate Matter (as expressed in COH Units)—1.0 average over the day.

At these levels there would be little or no outward physical effect due to above contaminants. There is however, the possibility that prolonged exposure to polluted air which met these standards might have a long-range health effect on individuals because of other contaminants present. Research has not progressed far enough at this time to know the health effects of low level concentration of air pollutants such as these. Whether air at the above levels of contamination is really safe in the large run must be determined if catastrophies such as those that occurred in London in 1948, 1952, 1956 and 1959 and in Donora, Pennsylvania in 1948 are to be avoided. Although these disasters were caused by sudden high concentrations of pollutants, it is possible that the cumulative effects of low-level pollutants could have similar results on large segments of the population.

The Statewide Policy

The Legislature's continuing and increasing concern over the problem of air pollution has manifested itself in the enactment of legislation at each legislative session.

Interim committee reports published by the Legislature during the past 10 years provide a vast amount of background information on the growth of the air pollution problem, the need for air pollution control measures, and on the health effects of air pollution.[1]

The State's policy in regard to Air Pollution Control was formalized in 1947 when the Legislature enacted a measure enabling the establish-

[1] A list of Interim Committee reports on air pollution may be found in Appendix.

ment of Air Pollution Control Districts (Division 20, Chapter 2, Health and Safety Code), which states in part that "The Legislature finds and declares that the people of the State of California have a primary interest in atmospheric purity and freedom of the air from any air contaminants and that there is pollution of the atmosphere in many portions of the State, which is detrimental to the public peace, health, safety, and welfare of the people of the State." (Section 24198.)

Because of the regional nature of the air pollution problem in the San Francisco Bay area which would have made single county air pollution control districts useless, the Legislature enacted, with the support of the counties concerned, the Bay Area Air Pollution Control Law (Division 20, Chapter 2.5, Health and Safety Code). The creation of this multicounty control district in 1955 re-emphasized the established policy of attaining clean air through vigorous enforcement programs.

While various districts were created to take the responsibility for investigating the causes of air pollution, setting up rules and regulations, and carrying out enforcement at the local level, the State Department of Public Health has been assigned a number of responsibilities on a statewide level.

In 1955 the Legislature authorized the establishment of an air sanitation program in the State Department of Public Health. Subsequently, a Bureau of Air Sanitation was established within the department's Division of Environmental Sanitation, and an Air Sanitation Laboratory Section was established within the Division of Laboratories to provide technical analysis and experimentation in conjunction with the bureau's activities. The bureau also works with the Bureau of Chronic Diseases, which is active in the study of the medical aspects of air pollution.

The programs of the State Department of Public Health and of the two principle air pollution control districts, Los Angeles and San Francisco, are discussed in the following sections.

II. THE DEPARTMENT OF PUBLIC HEALTH'S AIR MONITORING ACTIVITIES

The Department of Public Health does not engage in local enforcement of air pollution regulations. Its function has chiefly been one of co-ordination, consultation and technical assistance and investigation. In this way it is able to observe progress in air pollution control in all parts of the State and to aid districts and counties in taking advantage of developments outside their own jurisdiction.

It is increasingly evident that air pollution is not only remaining a serious problem in the State's two largest metropolitan areas, but it also developing in other sections of the State. In an attempt to measure and assess the statewide air pollution problem and its growth in new areas, the State Department of Public Health, through its Bureau of Air Sanitation, has maintained an air monitoring network.

As a result of the department's air monitoring, close liaison with the air pollution control districts, and co-operative progrms with a number of city and county health departments, it has been possible to bring together air monitoring data from all parts of the State. This information is being published in the department's *The Clean Air Quarterly*.

The greater part of the department's program has been centered around the development of air monitoring networks in the San Francisco Bay area, San Diego, Riverside, and San Bernardino Counties, and the Central Valley.

The Bay area air monitoring network, consisting of a series of air sampling stations operated by the Department of Public Health and nine city and county health departments, was established by the department in 1954. Measurements taken were sent to the Bureau of Air Sanitation, where they were tabulated and summarized periodically for distribution to member cities and other areas outside the Bay area. The responsibility for the maintenance of this program was turned over to the Bay Area Air Pollution Control District in 1957.

In 1957 a similar program was established with the co-operation of Central Valley County Health Departments. This co-operative network now includes stations at the Cities of Sacramento, Redding, Woodland, Stockton, Modesto, Merced, Fresno and Bakersfield. Daily measurements of oxidants and particulate matter are made. The Bureau of Air Sanitation co-ordinates the sampling program, compiles meteorological information and assists in the evaluation of data. This network is supplemented by special samplings by the bureau.

Consisting of a small number of stations over a very large area, this network cannot, in its present form, answer all the questions about air pollution in the Central Valley. The major purpose of the network is to obtain data that will give some indication about levels of oxidants, frequency of occurrence of high oxidant levels, and other information which would be useful in planning future air pollution control activities.

The Department of Public Health feels it is important "to demonstrate the need for air monitoring to local agencies. * * * Most of the measurements that are now being made in California are being made by local agencies, such as air pollution control districts and local health departments.

"It is our responsibility to make the full use of these measurements, and to supplement them to the extent that is needed to determine the statewide picture." [1]

Monitoring stations operated by the department are located in Berkeley, Stockton, San Diego and Riverside Counties. The San Diego and Riverside stations are operated jointly with the San Diego and Riverside County Air Pollution Control Districts. Through the department's efforts a standard system of instrument calibration has been effected for both state and locally operated monitoring stations. This will assure the gathering and reporting of comparable air pollution data from all stations operating in the State.

However, even with the information on air pollution levels supplied by city and county health departments, air pollution control districts, and the Department of Public Health's air monitoring network, there still remain serious gaps in our knowledge of the spread of air pollution into remote areas and movement between region and counties. This additional information is vital if a preventative program of air pollution control is to be started in these areas before the problems become as serious as they have in the metropolitan areas.

[1] Testimony of John Maga, November 12, 1958.

The Department of Public Health proposes that its monitoring network be expanded from 4 to 10 stations. These would be located as follows:

a. Southern California: near metropolitan regions (three stations rotated periodically).
b. Berkeley.
c. Remote area (probably north coastal county).
d. Sacramento-San Joaquin Valley area (two stations rotated periodically).
e. North Bay area counties, Monterey Bay area, Santa Barbara County (two stations rotated periodically).

With this additional equipment it will be possible to locate additional automatic recording instruments in the Central Valley and in fringe areas, and one station in a remote area to measure background levels of air pollution. These automatic recordings would be supplemented by manual sampling measurements carried on by county and city health departments.

Air Sanitation Laboratory

The Air Sanitation Laboratory operates a laboratory program to support the field activities of the Bureau of Air Sanitation. Here chemical analysis are made on all air samples collected by the bureau and, on request, of special air samplings done by local health and air pollution agencies. The Air Sanitation Laboratory and the Bureau of Air Sanitation act jointly to make available the special knowledge of the department in the calibration and maintenance of automatic recording equipment used by the several local air pollution control districts and agencies.

III. HEALTH EFFECTS OF AIR POLLUTION

The more obvious economic and nuisance effects of air pollution in California have been the subject of frequent and extensive inquiry and investigation by legislative, lay, and scientific groups. These more obvious effects have been the occurrence of eye irritation, crop damage, and severe reduction in visibility associated with smog.

With the increasing occurrence and severity of smog attacks in various sections of the State, strong suspicion is focused on air pollution as a contributor to a number of diseases.

In testimony presented to the Assembly Public Health Committee during the 1955-57 interim, Dr. Clarence A. Mills, Professor of Experimental Medicine, University of Cincinnati, maintained that "there no longer exists a reasonable doubt that Los Angeles smogs are indeed related to very considerable increases in respiratory and cardiac deaths."[1]

At that time the Bureau of Chronic Disease Control of the Department of Public Health could not confirm the findings of Dr. Mills regarding deaths attributable to smog. In an effort to gain more information to answer this problem and to determine what other effects air pollution has on public health, the bureau has continued its investigation, begun in 1954, into the medical and health effects of air pollution.

[1] Assembly Interim Committee on Public Health, "Air Pollution and the Public Health." Vol. 9, No. 11 (March, 1957) p. 15.

The Department of Public Health has undertaken both on an independent basis and through contract research, a series of mortality and morbidity studies designed to indicate the health effects of air pollution on the State's population. Among the projects sponsored by the department are:

1. A study of mortality statistics in relation to air pollution episodes in Los Angeles. Tentative findings indicate that the daily mortality pattern in Los Angeles even among the presumably most sensitive portion of the population, those over 65 years of age, discloses no clear relation to episodes of air pollution. (See Figure III.)

> "The data do show an increase in daily mortality during periods of excessive heat, for example when temperature exceeds 100 degrees. This effect is even more evident among persons who live in Los Angeles nursing homes, mostly feeble persons 70 years of age and older, many of whom have heart and lung disease. (See Figure IV.) The department has maintained a study of this group of persons for several years, and the mortality curve clearly rises with high atmospheric temperatures, but not during episodes of air pollution alone."[1]

2. In an attempt to ascertain whether there is any variation in mortality due to air pollution alone, the bureau, by using measurements taken in all parts of Los Angeles, has divided Los Angeles County into three study areas based on intensity of air pollution. Mortality records from these three areas will be compared to discover differences in death rates between high and intermediate air pollution areas. This study will have the advantage of excluding the temperature factor from the comparisons. (See Figure V.)

3. A morbidity study which involves the relationship between sickness and the occurrence of air pollution. The best information in this regard comes from the California Health Survey, a morbidity survey using a sample of the State's entire population. The results of a 1956 survey indicate that two-fifths of all adult Californians experienced some physical discomfort as a result of smog; two-thirds of the persons living in Los Angeles, and less than one-fifth of those living in San Francisco County or elsewhere in the State. (See Figure VI.) Another measure of this type will be available from the 1957-58 survey which is now being analyzed.

4. In addition to learning what the immediate human reactions to smog are, the department is also concerned about the possible long-term effects of exposure to air pollution. Dr. Breslow posed one question to be answered by the department's research.

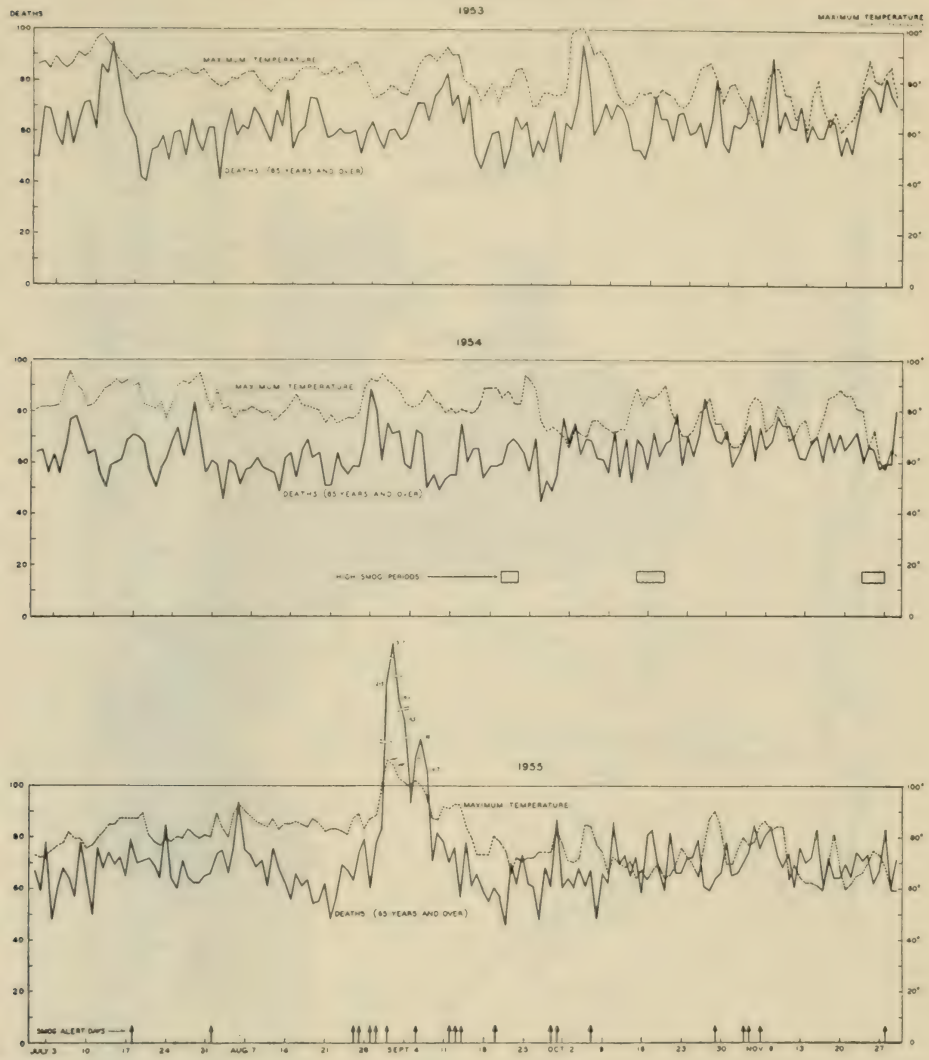
> "How safe is it to live in cities with air pollution for 10 years, 20 years, 30 years? Man has lately introduced a whole host of new agents into his environment and we are beginning to realize that many of them have harmful, even fatal, effects that may appear after many years of exposure. * * * Smog * * * may contain chemical agents that will show adverse effects after the lapse of a considerable time. Smog does contain substances capable of causing

[1] Testimony of Dr. Lester Breslow, Chief, Bureau of Chronic Disease Control, November 12, 1958).

FIGURE III

Deaths of Persons 65 Years and Over, and Maximum Daily Temperature

Los Angeles County, July 1-November 30, 1953, 1954, 1955

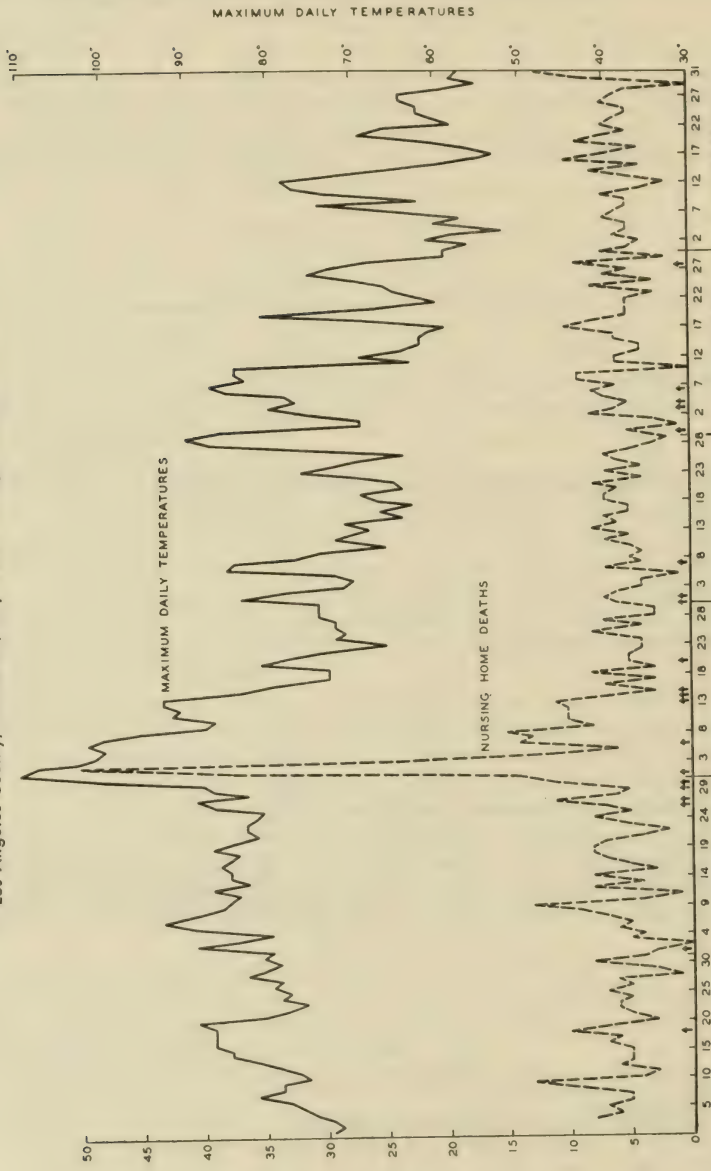


SOURCE: U. S. Weather Bureau
State of California, Department of Public Health, Death Records.

FIGURE IV

Nursing Home Deaths, Maximum Daily Temperatures and Smog Alert Days

Los Angeles County, California, July, 1955 Through December, 1955



SOURCE: State of California, Department of Public Health.

FIGURE V
Two-Community Study of Air Pollution
County of Los Angeles

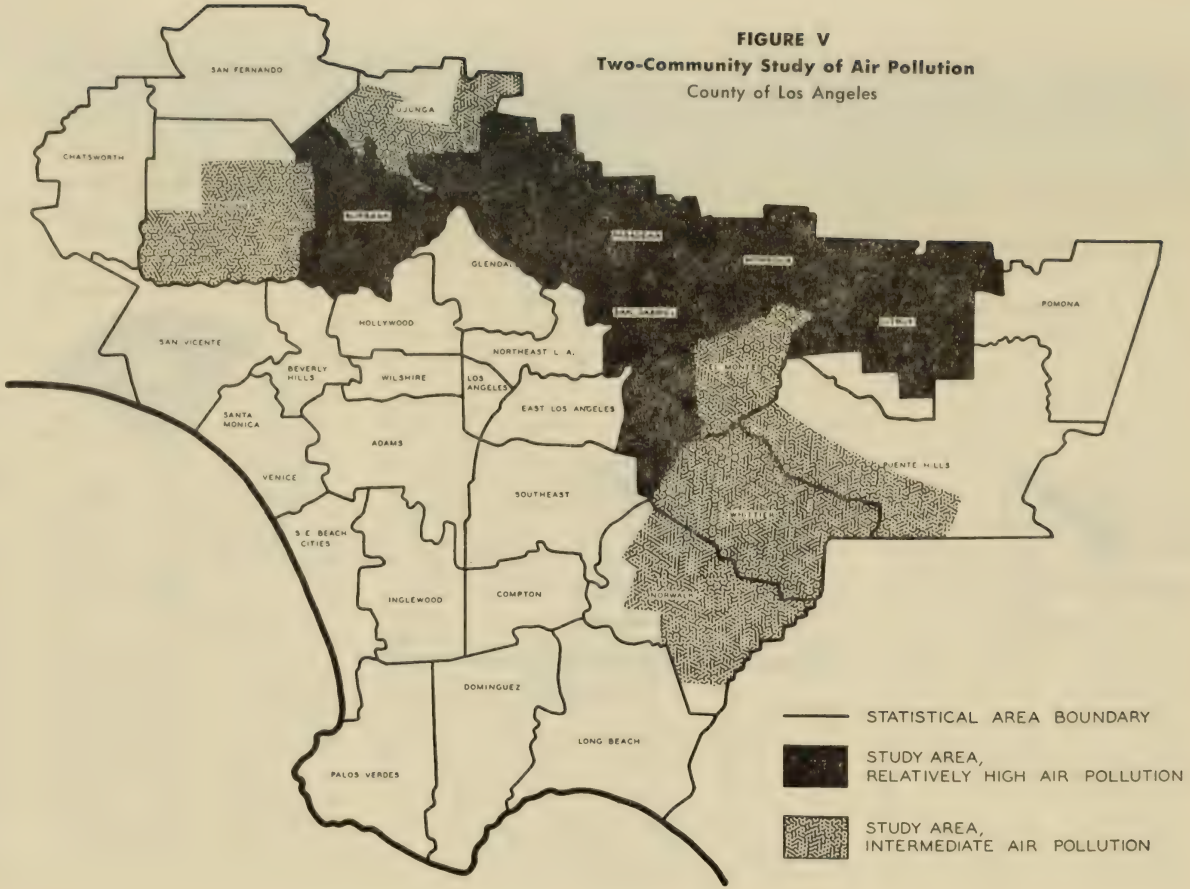
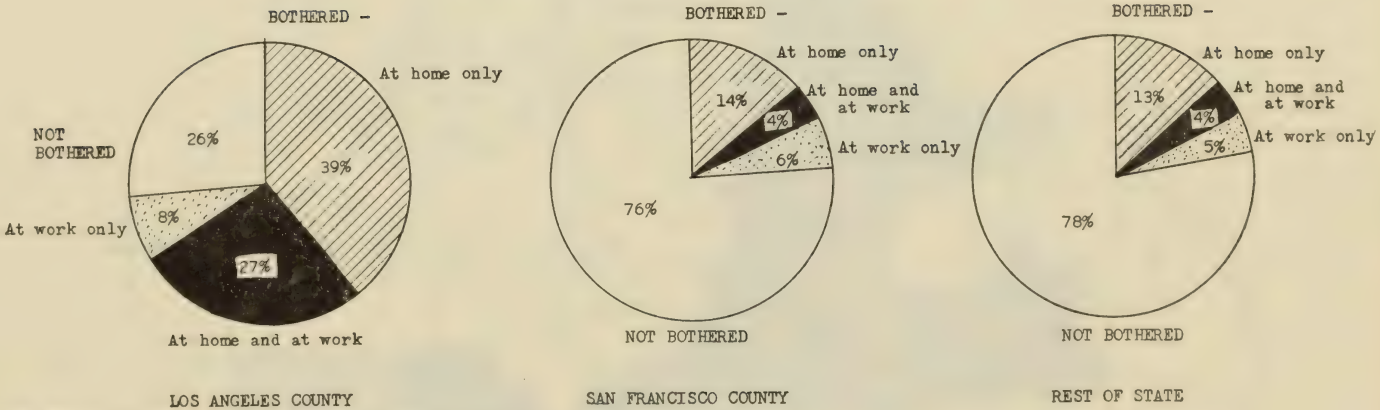


FIGURE VI
Proportion of Adults Bothered by Air Pollution



NOTE: Workers constitute only 55 percent of the population interviewed.
SOURCE: State of California, Department of Public Health.

cancer in animals, are these substances present in sufficient amount, and in a form to cause cancer to man?"[1]

To answer this question studies have begun to determine why the mortality rate from emphysema—a chronic lung disease usually found in older men—has increased about four fold since 1950. (See Figure VII.) In this disease, much of the lung is replaced by dialated air spaces, in effect dead air spaces, which cause the lung to perform its job of gas exchange inefficiently.

With the support of the American Cancer Society and the co-operation of the American Legion, the department has assembled records concerning length of residence in the air polluted areas, and other details of living, for more than 100,000 Californians. During the next several years the department will be noting the mortality from lung cancer and emphysema to determine whether California smog contributes to these diseases.

5. Lung function tests have been devised for the detection of air pollution effects on the lungs. These tests have been made on all 2,600 men in the Veterans Administration Domiciliary in West Los Angeles, and with the co-operation of the Vernon City Health Department, 6,500 persons were tested and answered questions about their smoking habits and symptoms of cough and shortness of breath.

The U. S. Public Health Service is conducting a program of research into the effects of air pollution upon people and their communities. In co-operation with the National Institutes of Health, the Public Health Service began research work in 1957, into three major areas: (a) effects upon the respiratory system, particularly the phenomena of hypersensitivity and allergenicity; (b) effects on the cardiovascular system, especially the extent to which cardiovascular and pulmonary respiratory conditions are aggravated by air pollution; (c) eye effects, with emphasis on eye irritation. Other studies began on the relationship of air pollution variations to the incidence and progression of various diseases; air pollution by specific industries (initial studies in steel and lead storage battery industries); and effects of different kinds of air pollution.

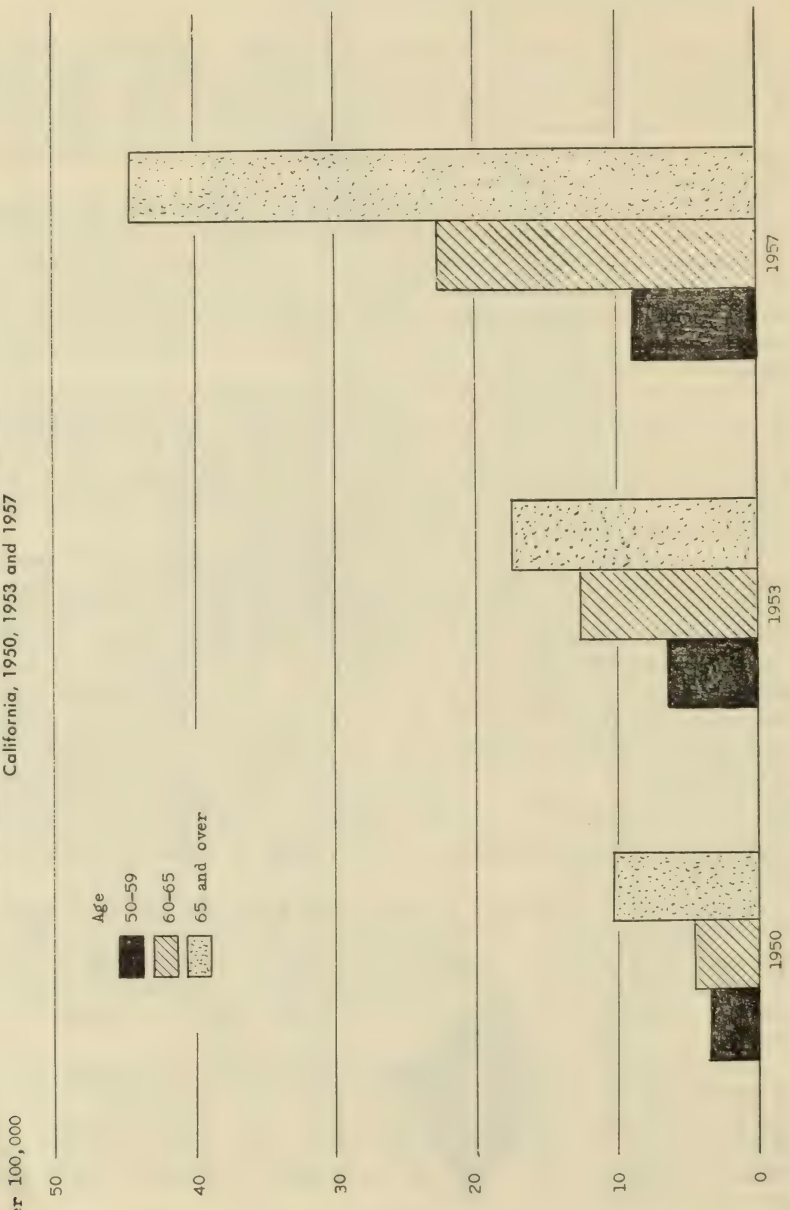
At this time it is difficult to access completely the effects of smog on the human population. Research methods are not precise enough, nor has data been collected systematically over a long enough period of time. When more information on the problem is gained through continuing research, the question of the exact danger of smog will be answered.

Nevertheless, the committee has received several statements warning of the danger to the public health resulting from the presence of smog. Surgeon General Leroy E. Burney, Chief of the United States Public Health Service, speaking before the National Air Pollution Conference, warned that there was mounting circumstantial evidence that polluted air was a cause of lung cancer.

> "We know that lung cancer death rates in the largest cities are twice as high as those in nonurban areas. * * * The case has not

[1] Dr. Lester Breslow, Chief, Bureau of Chronic Disease Control, November 12, 1958.

FIGURE VII
Age-Specific Mortality From Emphysema of the Lung
California, 1950, 1953 and 1957



SOURCE: State of California, Department of Public Health, Death Records.

yet been proved, but the weight of circumstantial evidence grows heavier as research progresses." [1]

The U. S. Public Health Service concluded that "it is abundantly clear that acute air pollution can cause death among the aged and infirm and serious illness in the general population. * * * It is possible that irritants present in air cause changes in the tissues of the respiratory tract and hamper breathing. Still unproved but supported by accumulating evidence is the theory that air pollution contributes significantly to mortality rates of many of the 'urban' diseases of contemporary society, including arteriosclerotic and other heart condition, and cancer of the lung, trachea, stomach, and esophagus." [2]

The Los Angeles County Medical Association, in a resolution adopted December 8, 1958, declared that:

> "Air pollution represents a present deleterious influence on the public health, as well as an imminent danger of catastrophic proportions. There are many different air pollutants which are injurious to health. Every opportunity should be taken to diminish them."

Research has indicated that extremely high levels of air pollution can be injurious to the public health. The question still to be answered is what effect will prolonged exposure to low levels of air pollution, levels even below those that cause eye smarting, have upon the public. Will long-term exposure produce cancer, lung or heart diseases? We do know some of the symptoms of irritating air pollution, but is the absence of these symptoms alone synonymous with "clean" or "safe" air? Although a definite answer cannot be given at this time, circumstantial evidence, as Dr. Burney indicated, points toward air pollution as a danger at any level of concentration.

IV. AIR POLLUTION CONTROL

Los Angeles Air Pollution Control Efforts

After 10 years of intensive effort to eliminate air pollution in Los Angeles County, smog still remains a serious problem in the area. In spite of a broad program of industrial pollution control and a ban on refuse burning, Los Angeles continues to suffer from severe smog conditions.

At the heart of the district's efforts to control air pollution is the industrial source control program. The "control system" involves an extremely rigid and thorough program of policing the construction and operation of all potential air pollution sources in Los Angeles County. This is accomplished through a district permit system which requires the issuing of permits for virtually all industrial operations which could tend to produce smog.

In 1957-58, more than 8,000 permits were issued by district engineers —175 were denied, and more than 84,000 industrial inspections were performed by field personnel of the enforcement division. Nearly 2,500 prosecutions in the local courts resulted from these inspections.

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[1] *San Francisco Chronicle*, November 19, 1958, p. 13.
[2] U. S. Public Health Service, *The Health Effects of Air Pollution*, Publication No. 640 (1958) p. 6.

> "It is this program that has been responsible for all the progress realized in curbing air pollution conditions in Los Angeles County —with the single exception the 1957 ban on refuse burning." [1]

It is estimated that from 1,500 to 2,000 tons of air contaminants currently are prevented from entering the Los Angeles atmosphere each day as a result of the industrial source control program.

> "Without these controls, air pollution conditions in this area would be infinitely worse. It is even possible that contaminant concentrations would be so high as to render the atmosphere dangerous to human health and safety." [1]

The Los Angeles district continues to maintain the largest air monitoring networks and one of the largest laboratories for the analysis of air samplings and engineering work on air pollution control equipment. Much of the information on these facilities has been published in previous reports of legislative committees.

Reporting on the results of the countywide incinerator ban which became completely effective on October 1, 1957, the district pointed out that over 500 tons of air contaminants per day were eliminated. The ban has produced not only a drastic reduction in public complaints caused by localized air pollution nuisances (a 20.43 percent decrease in 1956, and a 53.67 percent decrease in 1957), but also has startlingly reduced the number of uncontrolled fires started as a consequence to burning in incinerators. It is estimated that the ban would reduce the number of fires in Los Angeles County by some 6,500 per year, and the number of fire alarm incidents by some 13,000 per year.

Although it is difficult to separate the exact results of the incinerator ban from the overall smog control picture, it does seem that a ban has had a measurable effect on the reduction of particulate matter in the atmosphere as well as on the health and safety of the community.

Bay Area Air Pollution Control District

The Bay Area Air Pollution Control District, created by Chapter 1791, Statutes of 1955, is comprised of the counties of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, Napa, Sonoma, and Solano. Under the terms of the act the district shall not transact any business or exercise authority in the Counties of Napa, Sonoma, or Solano until the boards of supervisors of each county determines there is a need for the district to function in these counties. At this time no such determination has been made by these counties.

By December 1956, the district's board of directors had been organized, an advisory council appointed, and hearings commenced on the drafting of the district's first regulation. On March 20, 1957, Regulation 1 was promulgated, becoming effective on October 1, 1957.

Regulation 1 is a ban on open burning, except that connected with agricultural or fire prevention operations. The regulation is aimed at eliminating open burning at private and public dumps, scavenger yards, wrecking yards, and at open industrial backyard burning connected with the building industry.

[1] Testimony of Robert L. Chass, Director of Engineering, Los Angeles County Air Pollution Control District, October 28, 1958.

Since the adoption of the regulation steady progress has been made in eliminating open burning. With a few notable exceptions open burning has ceased in all counties, businesses formerly engaging in open burning have switched to the use of public cut and fill operations to dispose of refuse. A few have installed multichamber incinerators that increase the efficiency of the burning operation and reduce emissions of smoke and unburned matter.

The last exceptions to the generally excellent compliance with Regulation 1 were connected with the operations of the San Francisco Salvage Association, a group of 26 auto wrecking companies, 21 demolition and trucking companies, seven scrap metal reduction companies, and five refuse disposal dumps. Many of these companies have participated in the practice of open burning in violation of Regulation 1.

Although the district has used to a minimum the coercive powers it possesses, a policy of obtaining co-operation with air polluters to achieve air pollution control cannot function so long as one polluter refuses to co-operate, but instead, attempts to gain an economic advantage over its competitors by saving the costs of meeting district regulations.

As an example, on October 1, 1957, the day Regulation 1 became effective, the San Francisco Salvage Association brought an action before Superior Court in San Francisco seeking an injunction to restrain the district from enforcement of the regulation and to require the Fire Chief of San Francisco to issue burning permits to members of the association. On October 17th, the superior court denied a preliminary injunction and dissolved a previous restraining order on the district. At about the same time the Salvage Association filed with the district hearing board on behalf of its members an application for a class variance. During the period of litigation and proceedings before the hearing board, the members of the Salvage Association continued their illegal open burning activities. On December 19, 1957, a variance was denied and most of the members of the association have since then been in overt compliance with the district's regulations. Although there were sporadic fires at scrap yards and a few other salvage operations, there was open defiance and continued, almost daily, open burning at one or most refuse disposal dumps until January, 1959.

One refuse disposal dump had continued in open violation of the regulation until mid-summer 1958, when other operators once again began open burning. Proceedings against all of these operators have been before the hearing board. Some have gone through the entire enforcement procedure including superior court injunction. Others though have now stopped burning. Some are still being processed.

Adoption of Regulation 2

The Bay Area Air Pollution Control District is presently developing a second regulation, dealing with the control of dust, droplets, and combustive gases from industrial processes, incinerators, and heating and power plants. The procedure for adoption included a preliminary set of public hearings during which the district's board of directors received background information from district staff members, representatives of industry, and individaul citizens on the subject of the regulation. After discussion among interested parties before the board,

the data was digested by the staff in consultation with the advisory council. The regulation is now being drafted by the staff, to be reviewed by the advisory council and recommended to the board. A second set of public hearings will be scheduled, at which time the proposed content of Regulation 2 will be publically discussed for final changes and enactment by the board of directors.

Technical Report

Following meetings with representatives of industry to exchange and refine information on air pollution sources in the Bay area, the district staff with the co-operation of the advisory council, has published a comprehensive report on air pollution in the Bay area. The report discusses the nature of the air pollution problem in the Bay area, the extent to which each industry contributes to the problem, and estimates the total emmissions of pollutants by each industry and industrial process. The preparation of this report not only helped the district's staff and the public to have a better understanding of the problem, but also provided much information to the industries which were not familiar with air pollution problems. The report should provide the much needed groundwork for further control measures in the Bay region.

Public Education Program

In an attempt to keep the public and the industrial operators informed on the need for air pollution control and to furnish the necessary information for such control, the district has engaged in an extensive public education program. This program has included participation in group discussions, public speeches, radio and television appearances. The district also makes use of pamphlets and low cost educational films. The district has in its employ a public education specialist, and maintains a modest contract for press and news relations service with a small public relations firm.

Laboratory Facilities

The district maintains equipment for the monitoring of air pollutants including oxidants, sulfer dioxide, carbon monoxide, and nitric oxides. In addition there is special equipment for the identification and measurement of low concentrations of organic acids. This equipment includes a long-path infra-red spectromiter and a gas-liquid chromograph.

In addition to the services of the district's own technical staff, use is also made of personnel in state and federal technical agencies such as the State Department of Public Health, the Agricultural Extension Service, the Forest Fire Service, and the Radiological Defense Laboratory. In exchange the district participates in special studies being conducted by these agencies, and by serving on advisory committees and *ad hoc* groups.

Working closely with the laboratory staff is the air monitoring group that operates the semiautomatic and automatic air sampling and identification equipment in the field, using temporary stations including a station wagon and a house trailer converted into a mobile monitoring unit. The technical staff also supervises and co-ordinates the activities

of the several city and county health departments which do monitoring of air pollutants in the Bay area.

Technical Library

The district has developed for its own use, and the use of other specialists in air pollution who serve the owners of air pollution sources in the Bay area, a technical library containing over 7,000 items and reports on air pollution. Put together under contract with the Stanford Research Institute, at a cost of $39,000, the library, consisting mainly of items on microfilm, is serviced by a full-time special librarian and a clerical assistant. The most expensive component of the library was the index of air pollution items. It is designed so that it could be reproduced completely for others who might wish to have it at moderate cost. Negotiations are now under way with the U. S. Public Health Service and the New York State Air Pollution Control Agency for sale of a copy of the index.

Comparison Between the Los Angeles and the Bay Area Districts

The purpose and function of the BAAPCD is largely similar to that of the LAAPCD. The districts are governed by a board of directors, with power to establish a program for pollution control and effectuate it by rules and regulations. Provision is made for a hearing board, with authority to find violations and grant, modify or revoke variances.

However, significant differences exist between the two districts:

1. The board of directors of the Bay area district unlike that of its Los Angeles counterpart, includes elected representatives of cities as well as county supervisors.

2. A statutory advisory council is created to consult with the directors on the creation of regulations and general policy for the Bay area district. The council includes representatives from universities, health agencies, agriculture, industry, community planning, transportation, engineering, contracting, architecture, and labor.

3. No permit system is authorized in the Bay area law. The absence of such provision indicates the basic philosophy of co-operation with local agencies and violators the BAAPCD is attempting to carry out. It contrasts strongly with the Los Angeles district, which has the strictest regulations in the world today. The BAAPCD control officer has no power to require a review of plans for buildings or equipment or official approval of plans in the form of a permit to construct. Prevention is limited to action taken after the emission of a prohibited amount of pollution, not before. The board is expressly forbidden to specify the design of equipment, type of construction, or particular methods to be used in reducing air contaminants. However, the control officer is given authority to require from any person information relating to the degree of contamination being released.

4. In accord with the philosophy of co-operation rather than coercion, no misdemeanor penalties are imposed for violations of the statutes or board orders or rules. However, criminal penalties for violations may exist under city and county ordinances, whose operation is left unaffected by the Bay area law which does not "occupy the field." Furthermore, violations may be enjoined in a civil action brought by the

district attorney of the county where the violation occurs. Defiance of the court order will, of course, be punishable by contempt proceedings.

Essentially, the Bay area legislation seems to represent a compromise between programs of education and co-operation and those embodying the strict regulations and criminal penalties of the Los Angeles district. Air pollution control in the Bay area is still in its trial stages, and it remains to be seen whether enforcement and control can be made to catch up with the present growth in population, industries, and automobiles. The cumbersome enforcement of this largely co-operative system may have to give way under the urgency of reducing levels of air contaminants to below the present levels if the highest degree of co-operation by city and county governments and by the air polluters is not forthcoming.

V. AUTOMOBILE EXHAUSTS

As encouraging as the results of the industrial pollution control program may seem to be, gains that have been made in the control of hydrocarbons from industrial sources have been completely offset by the increased emissions of this contaminant from motor vehicles exhausts. Smith Griswold, the Los Angeles County Air Pollution Control District Officer, stated that:

> "The chief stumbling block to the solution of the smog problem in Los Angeles is the continued uncontrolled operation of our nearly three million motor vehicles. Until the exhaust of motor vehicles can be effectively controlled, we will continue to suffer from frequent and severe attacks of high irritating, plant damaging, and visibility reducing smog." [1]

Much of the Los Angeles smog, formed by the exposure of a pure hydrocarbon and nitrogen dioxide diluted with air to sunlight, is a direct result of the faulty exhaust system of the nearly three million motor vehicles operating in Los Angeles County. These arise partly from incomplete combustion of gasoline and partly from reaction processes in the engine. They are produced at widely differing rates depending on the phase of vehicle operation—acceleration, deceleration, idle, cruise—the mechanical condition of the engine, the degree of traffic congestion, and many other factors, including the driving habits of the individual operators. The organic products include a number of classes of organic compounds, ranging from low molecular weight gases such as methane which fail to react chemically to form smog products, to doubly unsaturated compounds such as butadiene which reacts rapidly to produce strong eye irritants. Between these extremes lies a great spectrum of reaction rates involving a very large number of organic species.

Although some progress in controlling auto exhaust emissions may be expected by varying the fuel composition used in automobile gasoline as has been indicated by district's research over the past year and a half, it is likely that the problem will remain until such time as an auto exhaust control mechanism is devised. Research to develop such a mechanism, carried on by the auto exhaust committee of the Automobile Manufacturers Association, the Los Angeles Air Pollution Control Dis-

[1] Testimony, October 28, 1958.

trict, and the Independent Air Pollution Foundation, has been directed along three lines.

The first was an attempt to develop a fuel cut-off device which would reduce the flow of fuel to the carburetion system during the deceleration phase of the automobile's operation when no power was required. It was believed that sufficient hydrocarbon loss would be prevented to produce a substantial effect on concentrations in the atmosphere. More recent data has shown however that such a device holds much less promise than was previously thought. At present, the deceleration cut-off "even operating at a maximum theoretical efficiency does not show promise of making serious inroads on the smog problem unless it can be integrated into a control system effecting losses in the other operating cycles." [1]

The second device being researched is the catalytic afterburner. In theory, a catalyst placed in the exhaust stream might oxidize all organic constituents into carbon dioxide and water. Several catalysts have been tested by the automobile industry. For example, vanadium pentoxide which has been under study by the research laboratories of the Ford Motor Company. Although seemingly promising for future development, it does have certain disadvantages. It appears to oxidize some exhaust constituents incompletely, producing carbon monoxide instead of harmless carbon dioxide; its high degree of solubility in water, coupled with the established toxicity of vanadium pentoxide will make necessary careful study of possible toxic contributions to the atmosphere.

A third type of exhaust control mechanism is the direct flame afterburner in which a spark plug or flame is placed in the exhaust line to burn the residual hydrocarbons. The basic problem is to assure that a combination of combustible fuel concentration and adequate temperature for combustion be maintained at all times during the car operation. In practice, this is usually meant, an auxiliary air supply regulated to temperature for manifold pressure demand, a heat recovery and regulation system involving exhaust line shunts and careful insulation, and in some cases, an additional automatically variable supply of fuel. All this means a relatively complicated system of mechanical and electrical linkages comprising an exhaust burner system.

None of the above exhaust control devices or exhaust burner systems are, according to the Automobile Manufacturers Association, within two years of final development, during which time smog conditions in Los Angeles and other parts of the State can be expected to become increasingly worse. Smith Griswold pointed out that:

> "In spite of all that has been done and is being done, in spite of everything we may do or not do to control air pollution sources, severe smog attacks will continue until the exhausts from motor vehicles are controlled. When they are controlled, we won't have any more smog, assuming only that there is no relaxation in the present program." [1]

The question must be asked as to whether the automobile industry and the Automobile Manufacturers Association is expending sufficient

[1] Testimony, October 28, 1958.

time, effort, and money in developing an auto exhaust control mechanism. The industry claims to have spent one million dollars a year for the last five years for research on automobile exhausts, and although much of the basic work done on the problem so far might not have been possible without the efforts of the Automobile Manufacturers Association, experience has proved that this level of expenditure is not sufficient to solve what is increasingly becoming a health menace in the State of California.

At the first national conference on air pollution held in Washington, D. C., in November, 1958, Dr. Chauncey D. Leake, Assistant Dean of the Ohio State College of Medicine, and representative of the American Association for the Advancement of Science, asked the pertinent question:

> "When are the auto and truck manufacturers going to turn from the foolishness of fins, from silly whims, from oversized models, and from too much horsepower to the essential but tough job of controlling auto exhausts."

The subcommittee realizes that a great deal of time is required for research on auto exhaust control mechanisms; however the successful completion of this research work is only being hindered by the expenditure of insufficient funds by the automobile manufacturers of the United States. Until such time as they are seriously willing to recognize this problem, California by virtue of its large automobile population, will suffer from increasing attacks of smog and air pollution.

The County Supervisors Association of California at its Fresno meeting on September 26, 1958, and the League of California Cities at its Annual Conference in Los Angeles on October 24, 1958, adopted resolutions calling on the motor vehicle manufacturing industry of the United States to speed its work on auto exhaust control mechanisms, and to report to the nation and to the State of California as soon as possible its constructive accomplishments to date, the work now underway, and the work planned, including a time schedule. The subcommittee wholeheartedly supports these resolutions by the County Supervisors Association and the League of California Cities and reminds the automobile manufacturers that this health menace cannot be allowed to continue unchecked indefinitely, for the time will come when the Legislature will have to take action to protect the people of California from a serious health menace.

When an automobile exhaust control device is developed, a new problem, perhaps of greater size, will present itself to the state. This will concern the administrative, legislative, and inspection problems bearing on automotive exhaust control. Work must begin at once to develop a system under which automobiles in California will be equipped with this device. This will present extremely complex administrative problems and answers must be found to such questions as:

What agency of the state will see that all automobiles are equipped with this device?

Who will inspect automobiles to see that they are equipped with an automotive exhaust control device?

How will these inspections be carried out?

Will such a device be required only on automobiles registered in counties of highest air pollution concentrations, such as Los Angeles?

How much time will be allowed for installation of such a device on new and used cars?

Who will see that these devices are being kept in operational order?

We do know that no device such as this will last forever. Therefore, there will be the problem of periodic replacement and thus a problem of periodic inspection. Any program which requires that an automobile exhaust control device be installed in automobiles must provide a reasonable time period before total compliance becomes mandatory. It must also be convenient in its requirements to the public which must comply with it, and to the public agencies which must enforce it, and the program must be carried out both in an effective and efficient manner.

More conflicts of problems in jurisdiction, agency objectives, procedures, and legislation can be anticipated. They should be resolved before a control device becomes available for application to vehicles. To accomplish this, the subcommittee feels that the Advisory Committee on Motor Vehicle Legislation and representatives of the Department of Motor Vehicles, California Highway Patrol, the Department of Public Health and the Motor Vehicle Exhaust Products Committee of the Automobile Manufacturers Association should explore the entire problem of automobile exhaust control, and should submit to the Legislature a detailed plan for the administration of such an exhaust control program. It will only be possible with such a preparatory study for the auto exhaust control program to be effectively implemented by legislation and effectively administrated once that legislation has passed.

APPENDIX

Previous Legislature Reports on Air Pollution

1. Assembly Interim Committee of Governmental Efficiency and Economy. "Report of the Investigation Into the Control of Smog." 1949, 21 pp.
2. Assembly Fact-Finding Committee on Water Pollution. *Final Report.* "Progress in Water and Air Pollution Control in the State, and Other Causes of Pollution." 1951. 110 pp.
3. Assembly Interim Committee on Governmental Efficiency and Economy. "Study and Analysis of the Facts Pertaining to Air Pollution Control in Los Angeles County." 1953. 19 pp.
4. Assembly Joint Subcommittee on Air Pollution of Assembly Interim Committees on Conservation, Planning, and Public Works and Public Health. "Air Pollution Control" Vol. 13, No. 3 (January, 1955) 60 pp.
5. Assembly Joint Subcommittee on Air Pollution of Assembly Interim Committees on Conservation, Planning, and Public Works and Public Health. "Air Pollution in the San Francisco Bay Area" Vol. 13, No. 4 (February 1955). 103 pp.
6. Assembly, Interim Committee on Public Health. Subcommittee on Health Effects of Smog. "Air Pollution and the Public Health" Vol. 9, No. 11 (March, 1957) 56 pp.
7. Assembly Interim Committee on Public Health, Subcommittee on Air Pollution. Final Report. Vol. 9, No. 12 (March, 1957) pp. 9-17.

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REPORT OF THE

SUBCOMMITTEE ON NARCOTICS AND DANGEROUS DRUGS ASSEMBLY INTERIM COMMITTEE ON PUBLIC HEALTH

House Resolution No. 219, 1957

March, 1959

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COMMITTEE LETTER OF TRANSMITTAL

ASSEMBLY CHAMBER, STATE CAPITOL
SACRAMENTO, March 16, 1959

HON. RALPH M. BROWN
Speaker of the Assembly, and
Members of the Assembly
Assembly Chamber, Sacramento

GENTLEMEN: The Assembly Interim Committee on Public Health submits the Report on Narcotics and Dangerous Drugs prepared by the Subcommittee on Narcotics and Dangerous Drugs in accordance with House Resolution No. 180 of the 1957 Session.

Respectfully submitted,

W. BYRON RUMFORD, Chairman
Assembly Interim Committee on
Public Health

SUBCOMMITTEE LETTER OF TRANSMITTAL

ASSEMBLY CHAMBER, STATE CAPITOL
SACRAMENTO, March 16, 1959

HON. W. BYRON RUMFORD, *Chairman*
Assembly Interim Committee on Public Health

DEAR MR. RUMFORD: The Subcommittee on Narcotics and Dangerous Drugs was appointed following adjournment of the 1957 General Legislative Session in accordance with the provisions of House Resolution No. 180. This report is the result of the hearings held by the subcommittee since that time.

During the same interim period other legislative committees have been investigating various aspects of the narcotics problem. This committee has attempted to co-ordinate its work with that of these other committees to avoid duplication of effort. The Subcommittee on Narcotics of the Assembly Interim Committee on Judiciary has studied the penal aspects of the narcotics problem. The Senate Committee on Narcotics has been concerned with a number of aspects of the narcotics problem. The Senate committee and this committee held a joint hearing to consider the need for a public school educational program in the field of narcotics.

This committee has restricted its study, and this report, for the most part, to the problem of the treatment and rehabilitation of narcotic drug addicts, calling attention to or discussing other aspects of the problem only when necessary for an understanding of the problems of rehabilitation or treatment.

The subcommittee wishes to express its appreciation to the many individuals, the representatives of medicine, state and local agencies, and other organizations whose testimony at the public hearings and whose advice and consultation throughout the interim have been of such assistance.

Respectfully submitted,

REX M. CUNNINGHAM, Chairman
Subcommittee on Narcotics and Dangerous Drugs
GEORGE G. CRAWFORD
CLAYTON A. DILLS
DON MULFORD
W. BYRON RUMFORD
HOWARD J. THELIN

FINDINGS

1. It is impossible, on the basis of present information, to determine the exact extent of the narcotics addition problem. The major part of the problem, however, is known to be concentrated in economically depressed, high-delinquency areas within large metropolitan areas, principally in Los Angeles County.
2. Most addicts are delinquently oriented persons with deeply imbedded personality inadequacies. Punishment has not proven effective in deterring addiction, and yet programs for the treatment and rehabilitation of the addict are almost nonexistent. There is an evident need for the establishment of pilot rehabilitation programs, study and research to determine the type of programs which may be effective in rehabilitating the addict.
3. California law specifies in great detail the type of medical treatment which may be provided the addict, who may provide it and where.
4. Facilities which are permitted by law to treat the narcotic addict in California are almost nonexistent. This is true for both the addict who seeks treatment voluntarily or for the addict who is arrested and committed to a state hopital, a county jail or state prison. There is no place in the State with an integrated program of hospitalization, psychiatric care and rehabilitation for addicts. Medical care to ease the stress of an addict withdrawing from the drugs is provided, at extremely high cost, in only a very few private institutions, most often not at all in the county jails and only infrequently in county hospitals. Addicts in state hospitals and prisons receive no special treatment; the same programs offered all others in the institutions are available to the narcotic addict but they are not mandatory. Only recently in some counties have programs been developed in an attempt to deal with the narcotic addict and they are limited in scope. There is even less provision for post-institutional care.
5. A few small "pilot" programs aimed at rehabilitating the addict have or are being conducted by voluntary, local or state agencies. However, the findings and results of these programs are not being used by other agencies and whatever may have been learned in these programs will be lost without some concerted effort on the state level to study the problems and methods of rehabilitation.
6. A multifaceted but integrated approach is necessary to make any inroads on the problem. There are now many federal, state and local agencies charged with enforcement of narcotic laws. These and other agencies are concerned with the treatment and rehabilitation of the addict. There is no one agency which can co-ordinate the programs of these many enforcement and treatment agencies to insure that an integrated effort is made to solve the narcotic problem.

RECOMMENDATIONS

1. That a special limited term state narcotics commission be established to study all aspects of the narcotics problem; to make recommendations as to the possible need for the establishment of a single agency within the State to co-ordinate the programs of the many concerned agencies within the State; to study particularly those problems relating to the causes, control and prevention of narcotic addiction, and to the treatment and rehabilitation of drug addicts; to promote the co-ordination of medical facilities and rehabilitation programs established for the treatment of addiction; and to inform the public and stimulate community understanding as to the many complex aspects of the narcotics problem.
2. That additional study be given to the present laws relating to the treatment of the narcotic addict and to the laws relating to the voluntary commitment of addicts for treatment to determine whether or not revision of these laws would permit a more realistic approach to the treatment and rehabilitation problem.
3. That legislation be enacted authorizing the State to assist counties in the establishment of treatment units in conjunction with county jail and probation programs for the rehabilitation of addicts.
4. That legislation be enacted to institute a pilot or experimental treatment control unit for the treatment and rehabilitation of persons committed to the custody of the Director of Corrections or the Director of the Youth Authority where parolees of the Departments of Correction of the Youth Authority could receive institutional treatment when needed; that in conjunction with such program, specially trained parole agents with smaller caseloads be assigned to supervise formerly addicted parolees.
5. That encouragement be given to Narcotics Anonymous groups in the community, especially in those areas where the addiction is known to be the greatest, and to their establishment in the state and local institutions to assist in the rehabilitation of the addicts committed thereto.
6. That, because the inclusion of marijuana in the California definition of narcotics adds to the difficulty of determining the number and type of addicts convicted of narcotic law violation, favorable consideration be given to legislation introduced at this session to make a distinction in the Health and Safety Code between marijuana and the opiate and other narcotic drugs.
7. That, with regard to the enforcement of the narcotic laws, there be increased effort on the part of the Federal Government to stop the flow of illegal narcotics into the State; that narcotic law enforcement agencies at every level of government make an increasing effort to apprehend and prosecute the nonaddict "big-time" narcotic importer, wholesaler and distributor; and that there be continuing and increased training of narcotic agents in all the complicated details of narcotic traffic and the problems involved in its reduction.

INTRODUCTION

"Narcotic addiction is fundamentally a problem in mental hygiene. It is primarily a psychobiological illness, and only secondarily, is it a legal or criminal problem. The legal, criminal problem arises as a result of existing law and as a consequence of the fact that it is necessary for addicts to resort to crime in order to secure money for the drugs. The general philosophy therefore should be that the management of narcotic addicts ought to be oriented in the direction of social rehabilitation and not that of punishment."

Report to Attorney General Edmund G. Brown by the Citizens' Advisory Committee to the Attorney General on Crime Prevention March 26, 1954, p. 31.

The concept that narcotic addiction is not simply a penal problem but one which also involves medical, psychological and sociological factors is now generally accepted. A 1957 report on narcotic addiction from the Council on Mental Health of the American Medical Association reported, for example, that "* * * narcotic addiction should be viewed much more than it has in the past, as an illness. * * * There should be a progressive movement in the direction of treating addiction medically rather than punitively." *

Because of the increasing recognition of the addict as a "sick person" with a corresponding stress on the need for medical treatment and psychotherapy, the Subcommittee on Narcotics and Dangerous Drugs restricted its study, for the most part, to an investigation into the various aspects of treatment and rehabilitation of the narcotic addict. It reviewed the legal provisions for treatment and medical care in California, the status of knowledge as to treatment procedures and their effectiveness, and the types of treatment that are presently available for the addict in California.

During the fall of 1957 there was a great deal of publicity and deep public concern over an apparent lack of co-ordination and co-operation among and between federal, state and local agencies with responsibility in narcotic law enforcement. The subcommittee therefore initiated an investigation into the responsibilities of the California State Bureau of Narcotics, into the Bureau's effectiveness in the performance of these responsibilities, and into its relationships with those federal and local governmental agencies also working in the field of narcotic law enforcement. This report contains a brief section on the committee's investigation of these problems.

PUBLIC HEARINGS

The subcommittee conducted public hearings on February 13 and 14, 1958, in San Francisco and in Los Angeles on May 19, 1958, to consider the rehabilitation and treatment problem. On November 13 and 14, 1958, the subcommittee met in joint session in Sacramento with the Senate

* Council on Mental Health, American Medical Association "Report on Narcotic Addiction," *Journal of the American Association,* Nov. 30, 1957, p. 1707.

Interim Committee on Narcotics to hear testimony on the possible need for a narcotics education program in the State's public schools.

The questions relating to the organization and administration of the Bureau of Narcotics and its relationships with other narcotic law enforcement agencies were considered at hearings held by the committee in San Francisco on November 4, 1957 and in Oxnard on May 20, 1958.

THE PROBLEM

WHAT IS ADDICTION?

The United Nations World Health Organization has defined drug addiction as "a state of periodic or chronic intoxication detrimental to the individual and society, produced by repeated consumption of a drug (natural or synthetic). Its characteristics include: (1) an overpowering desire or need (compulsion) to continue taking the drug and to obtain it by any means; (2) a tendency to increase the dose; (3) a psychic (psychological) and sometimes, a physical dependence on the effects of the drug." *

According to this definition, many drugs are addicting. A number of distinctions must be made beyond this definition for an understanding of the narcotic addiction problem which is of such great concern in California today. Witnesses at the public hearings indicated that a distinction first must be made between the habit-forming and addicting substances. For example, while tobacco and coffee are habit forming they are not addicting in the sense that heroin is. Another distinction is that between the drugs which are stimulants and those which are depressants. Stimulants which produce sleeplessness or hyperirritability include cocaine, amphetamine (benzedrine), mescaline and dexadrine. The depressants which tend to induce sleep, lessen nervousness, include opium and its derivatives (especially morphine and heroin), synthetic analgesics, demerol, the hypnotics and sedatives such as the bromides, barbiturates, and alcohol.

The California definition of narcotic drugs is found in the Health and Safety Code, Section 11001. It defines the drugs mentioned above (with the exception of alcohol) as narcotics; it makes no distinction between the stimulants and depressants. In addition to most of the drugs mentioned above, the California law includes marijuana as a narcotic drug, although it is not addicting in the same sense as heroin or the barbiturates. Dr. Joel Fort, psychiatrist at the Berkeley Mental Hygiene Clinic, stated that "pharmacologically speaking, marijuana is not an addicting drug. It does not produce physical tolerance so that the user needs to increase his dose as time goes on. Nor does it produce a physical dependence resulting in the user's becoming physically ill when the drug is withdrawn." [1]

Richard A. McGee, Director of the Department of Correction, stated that "We have mixed up those drugs which are habit-forming with marijuana which is not habit-forming in the sense of addiction. * * * There needs to be, in my opinion, a separation in the code of these two items." [2]

The concern today over addiction is limited almost entirely to opium and its derivatives, especially heroin and morphine, and to synthetic

* U. N. Expert Committee on Drugs Liable to Produce Addiction, Report 6-7 (World Health Organization Technical Report Series No. 21, 1950).
[1] Committee hearing, February 14, 1958.
[2] Committee hearing: November 14, 1958.

substitutes for opium. Barbituates are becoming an increasing problem and they too are addicting, resulting in both physical and psychological dependence. Marijuana is of concern principally because it is considered by some to be a "stepping stone" to opiate addiction. Cocaine is seldom mentioned today as a problem. The other stimulants such as benzadrine and dexadrine represent an important group but it is felt that their effect and therefore the problem they create differs from that of the opiates. While habituation to these drugs may develop, few consider it a true physiological addiction.

NARCOTIC ADDICTS IN CALIFORNIA—THE HIDDEN POPULATION

Any attempt to estimate the number of narcotic users or addicts is at best a risky business. Inasmuch as narcotic addiction and the traffic it supports are illegal, we are dealing with a "hidden population" and most of the information about this population must necessarily come from the law enforcement agencies with whom the addict comes in contact. On this basis, it is usually estimated that there are some 60,000 addicts in the United States. No more than a guess can be made of the number of addicts in California. Richard A. McGee, Director of the State Department of Corrections stated that, "We don't know how much drug addiction there is in the State of California. Nobody knows how much there is in the United States. But, if we have anything less than 20,000 persons who are or have been addicts in the State of California, I would be very much surprised." [2]

Addicts in Prison and Jail

Some addicts are found in the state prisons and county jails. In 1957, there were 2,291 persons convicted of a felony violation of the state narcotic laws. Eight hundred eighty-eight of these were sentenced to a state prison and 117 to the Youth Authority. The remaining 1,286 were sentenced to county jail or probation. (See Table 1.)

TABLE 1
NARCOTICS FELONY ARRESTS, CONVICTIONS, AND SENTENCES AND RATES PER 100,000 POPULATION, 1957

	Number			*Rate per 100,000 population*		
	State total	*Los Angeles County*	*State less L. A. County*	*State total*	*Los Angeles County*	*State less L. A. County*
Adult felony arrests	10,373	7,731	2,622	73.1	138.1	30.6
Superior court filings	3,238	2,050	1,188	22.9	36.6	13.9
Superior court convictions	2,291	1,314	977	16.2	23.5	11.4
Sentenced to prison or Youth Authority	1,005	526	479	7.1	9.4	5.6
Sentenced to jail or probation	1,286	788	498	9.1	14.1	5.8

SOURCE: Board of Corrections, *Narcotics in California*, February, 1959, p. 24.

While the Department of Corrections knows the number of persons convicted of a violation of the narcotic laws, this alone does not provide a good index of the extent of addiction. Many persons who are narcotic addicts are arrested for other offenses. The inclusion of marijuana in the same section of the Health and Safety Code as the addicting drugs further complicates the task of determining the number of drug addicts

[2] Committee hearing, November 14, 1958.

there are in the State and how many addicts are arrested each year. Nor do the statistics separate the occasional users from the addicts. Dr. A. LaMont Smith, Executive Officer of the Board of Corrections, pointed out that "at the present time the statutory penalty for the individual with one marijuana cigarette is the same as that for one with a pound of heroin. The statistics reflect the code section under which a person is committed and do not therefore describe the true nature of the problem with which we are dealing."

The fallacy of using the number of narcotic law violators as an index to the extent of narcotic addiction in state correctional institutions was well demonstrated in a study recently conducted by the State Department of Corrections.[3] The study was based on inmates who were received or held at state institutions during a particular period of study. It was found that over one-half of the adult male heroin addicts received at the institutions during the study period were convicted of criminal offenses *other* than the narcotic laws. Almost two-thirds of the male youths found to be heroin addicts were convicted of offenses other than narcotic law violations. Of the adult women offenders found to be heroin addicts, almost 40 percent were committed for non-narcotic law offenses.

If the groups studied were representative of the institutional population as a whole, it would be possible to say that roughly 16 percent of the population of State Department of Correction institutions for men are heroin addicts and 9 percent marijuana users; 11 percent of the male youth offenders are heroin addicts and 13 percent regular marijuana users; 33 percent of the adult women offenders are heroin addicts and 3 percent marijuana users. Mr. McGee has stated that on the average about one-sixth of all the people the Department of Corrections has in its custody are heroin addicts. He excludes from that estimate the "marijuana smokers or those who have played around with drugs."[4]

Commenting on the number of drug users among the youth population, Dr. C. J. Brown, Chief of Medical Services, California Youth Authority, felt that "a great deal of research will be required in order to determine the true figures with respect to drug usage by the youth population committed to the Youth Authority."[5] Interviews during 1957 with a selected sample of Youth Authority committees indicated that 21.7 percent admitted the previous use of narcotics, but only 7.4 percent stated that they were used regularly. Should marijuana be excluded from these statistics, only 1.9 percent admitted to the regular use of drugs.

The Board of Corrections report showed that the typical heroin addict first began using opiates when he was 20 years old and was first arrested for a violation of the narcotic laws when he was 21. Yet the average age of the heroin addict in the state prisons is 27. We don't know what is happening to the addict between the time of his first arrest and his commitment to the state prison. Some are undoubtedly committed to the Youth Authority and some to county jail and are reflected in the figures above. Some are hidden in the

[3] State of California, Board of Corrections. *Narcotics in California*, February, 1959.
[4] Committee hearing, November 14, 1958.
[5] *Ibid*, February 14, 1958.

figures showing the number convicted for violation of some non-narcotic law violation. Others are very likely convicted of misdemeanors and *no* records are kept of the number of addicts convicted of a misdemeanor violation of either narcotic or other laws.

Addicts in State Hospitals

A judge may commit an addict to a state mental hospital if he feels the addict to be amenable to treatment. (Sections 5350 and 5400, Welfare and Institutions Code.) Very few addicts, however, are committed under these provisions. One June 30, 1957, for example, there were only 52 male and 21 female narcotic drug addicts, and 6 male and 14 female habit forming drug addicts in all state mental hospitals.

During the entire year ending June 30, 1957, 351 narcotic drug addicts and 65 habit-forming drug addicts were committed. During the next year 245 narcotic drug addicts and 86 habit-forming drug addicts were committed.

The major conclusion that may be drawn from the statistics presented to the committee is that it is impossible to determine at this time the number of drug addicts and users in the State. Statistics on arrests and convictions are not a true indication of the extent of the addicted population or of the scope of the problem facing the State in dealing with drug addiction.

Where Is Addiction Found?

Addiction is mainly localized in large urban centers. Cities which reportedly have the highest concentrations of addicts include New York, Chicago, Washington, D. C. and Los Angeles. Sociological studies conducted in areas where the problem is great have shown that addiction, especially of youths, is largely confined to very limited areas of the cities involved. These areas are the poorest in the cities and are characterized by the lowest income, poorest housing, most unstable family structures, the highest delinquency rates and large minority group populations. In such areas, juvenile gangs are prominent in the life of the boys.[6]

The Board of Corrections' study showed that a similar situation exists with regard to addicts in California who have been convicted of narcotic law offenses. The problem of addiction was found to be the greatest in Southern California, particularly in Los Angeles. Addicts were for the most part from underprivileged groups and the incidence of addiction was the highest for numbers of minority groups.[7]

Who Is the Addict?

It would be extremely difficult to describe the "average" addict. Most authorities agree that a variety of factors—socioeconomic, psychiatric, psychological and physiological—act together and in various combinations to create the addict. The importance of these factors varies from individual to individual, from one region to another and from

[6] American Medical Associated Council on Mental Health, "Report on Narcotic Addiction," *Journal of the American Medical Association*, November 30, 1957, p. 1712.
[7] State of California, Board of Corrections, *Narcotics in California*, February, 1959.

time to time. Witnesses described addiction as a symptom of varying personality inadequacies rather than a disease in itself. Discussing the factors of addiction the Council on Mental Health of the American Medical Association reported that:

> "There is a general agreement among all students of addiction that addicts have personality aberrations and that these psychiatric conditions preceded and played an important role in the genesis of addiction, its maintenance, and the higher relapse rate after treatment. * * * The majority of addicts present mixtures of traits of the kind found in neuroses, character disorders, and inadequate personalities. * * * Currently, the immature, hedonistic, inadequate addict dominates the scene." [8]

Such a person, who also has developed a physiological and psychological dependence on narcotics, is forced to seek the drugs to maintain his habit and he will use any and all means to do so. Whether or not addiction leads to crime and delinquency or whether delinquency precedes addiction has been frequently debated and diverse views are held. It is generally agreed however that the majority of heroin addicts do have to engage in crime in order to support their habit and further that addicts usually commit crime against property. Assaultive crimes are not characteristic of the heroin addict.

The picture of the narcotic addict is usually that of the "hard core" addict, the one who is in and out of the prisons and jails time after time and is continually seeking drugs. However, there is no one particular type of person who is a drug addict or, as Dr. Philip May, Clinical Director at Camarillo State Hospital put it, "The one thing that drug addicts have in common is that they are addicted to drugs and that is about the only thing they have in common." [9]

The committee heard in this regard that one Narcotics Anonymous group in Los Angeles included a psychiatrist, a farm laborer, the executive secretary of a large business firm, housewives, as well as some who had been released from jail or prison.

Addiction is also found among members of the medical profession. Between 1948 and 1958, the State Board of Medical Examiners reviewed 138 cases where doctors had been either narcotic users or addicts. Fifteen of these cases were heard during 1957. Action was taken against 31 registered nurses during 1958 for the use of or addiction to narcotics. Nor do these figures present a complete picture of the extent of the problem. They do not include those narcotic users who, for example, were voluntarily or court-committed to the state hospitals for the treatment of mental illness.

[8] Journal of the American Medical Association, November 30, 1957, p. 1712.
[9] Committee hearing, May 19, 1958.

TREATMENT AND REHABILITATION

Treatment for narcotic addiction is usually conceived of in two phases. The first phase involves the actual withdrawal of the drug. The second phase involves keeping the addict off the drug.

The actual breaking of the physical dependence is considered to be by far the easiest part of the treatment. The addict, during the withdrawal period, is a patient in the true sense of the word who needs medical care just as does any seriously ill person. Methods and procedures for treatment during this period are well known. The usual method involves the gradual withdrawal of the drug. Other drugs which are not physiologically addicting are substituted to ease the patient through this period. Methadon or one of the tranquilizers is most often used for this purpose. Another method recently developed by Dr. Stuart C. Knox involves the administration of certain enzymes to eliminate the physical symptoms associated with the withdrawal of the addicting drugs.[10]

A few still favor letting the addict kick the habit "cold turkey" in the belief that the remembrance of the withdrawal suffering will deter the addict from returning to the drug use. This, most authorities agree, is not in fact the case.[11] Very often, however, especially in our county jails, no medication is provided the addict to ease the stress during this period.

Once the physical dependence on the drug is broken, the problem is to rehabilitate the patient so that he will not revert to drug usage. And here, because there is no single simple cause for addiction, there is no single simple solution. The nature of the rehabilitation treatment must depend on the nature of the causes responsible for creating the addict-prone individual initially. This phase is normally conceived of as involving intensive psychotherapy and followup care. The addict must receive the support necessary to help him from succumbing to those forces which caused him to use the drugs in the first place.

Surprisingly little is known about the methods of rehabilitating the addict or the effectiveness of the methods generally discussed; little will be known until such time as test or pilot programs are established.

The present methods for treating the majority of narcotic addicts are clearly unsatisfactory. The relapse rate, although not known exactly, is high and generally the chances for rehabilitation are viewed with pessimism. Some claim that the reason lies with the inadequacies of the treatment now available. Others claim that it is simply because "once an addict, always an addict."

Several witnesses emphasized the need to consider the causes of addiction and the type of personality of the person who is addicted. The typical heroin addict in the state prisons, according to the Board of Corrections, has had a long history of delinquent associations and conduct dating back to middle adolescence. It is difficult to rehabilitate this

[10] For further discussion of Dr. Knox' proposed pattern for treatment, see page 32.
[11] Duke University, School of Law, "Narcotics" *Law and Contemporary Problems* Volume XXII, No. 1, Winter, 1957, p. 439.

person under any circumstances. It is doubly difficult to rehabilitate the delinquent who has developed a physiological and psychological dependence on narcotics. The experiences with this addict have cast doubt on the possibility of successful treatment.

The causes underlying the addiction of the doctor and the nurse are clearly different from the causes underlying the addiction of the delinquent or criminal addict found in the prisons, and the high "cure rate" for this group is a clear indication that addiction itself is not incurable. In this regard, the Board of Medical Examiners reported that of 49 doctors placed on probation for drug usage between 1948 and 1952, only 8 percent had their licenses revoked for reuse of narcotics prior to the expiration of their probation period. Between 1953 and 1957, of the 81 placed on probation, only 6.5 percent had their licenses revoked for returning to the use of drugs.

Dr. May pointed out the fallacy of judging the worth of a particular treatment method by looking at the recidivist rate of a large group of addicts who underwent that particular treatment. "If you take a number of automobiles that have stalled and find that one-third of them will start if the ignition is turned on, you cannot interpret this as meaning that the other two-thirds will never run again. Another one-third might need new batteries or more gasoline. * * * It is the same with drug addiction." [12]

The need to re-evaluate the concept of "cure" was also emphasized by several witnesses. Since, as Dr. Walter Bailey pointed out, addiction by definition includes the tendency to relapse or return to the drugs, the fact that the addict does relapse cannot be interpreted to mean that addiction is incurable. It may merely indicate the need for further treatment. Dr. May stated that "I have heard the question asked, 'How many people do you cure?.' The surgeons have a very nice way of putting this. When they operate on somebody who has cancer, they talk about a one-year cure and a two-year cure or a three-year cure. If there is no return of the cancer for three years, then it is a three-year cure. * * * I think that this is the way we should look at narcotic statistics. It isn't a question of whether you cure someone or not. It is a question of how long the person stays off the drugs."

LEGAL PROVISION FOR TREATMENT IN CALIFORNIA

The State laws relating to medical care for narcotic addicts are contained in the Health and Safety Code (Sections 11390-11426). They specify where an addict may be treated, who may prescribe drugs for addicts, and the amount of various types of drugs which may be administered.

At all times during treatment the addict must be confined and kept under restraint and control. Addicts may be treated only within a city or county jail, a state prison, a state or county hospital or an institution which has received the approval of the Board of Medical Examiners for the treatment of narcotic addicts. This is in conformance with Section 2391 of the Business and Professions Code relating to the practice of medicine and surgery and Section 11391 of the Health and Safety Code. Each of these laws prohibits the ambulatory treatment of

[12] Committee hearing, May 19, 1958.

narcotic addicts and requires that narcotic addicts can *only* be treated in a hospital or institution approved by the board.

Only a physician or a registered nurse under the direction of a physician may administer narcotics in treating an addict for addiction. The amounts and kinds of narcotics which a physician may prescribe for or furnish to the addict during each of the first 15 days of treatment and during the last 15 days of the 30-day reduction period are specified. At the end of 30 days from the start of the treatment the administration of narcotics must be discontinued.

A physician treating a person for addiction is required to submit a report to the Division of Narcotic Enforcement containing the name and address of the patient, the name and quantities of narcotics if any prescribed, and the progress of the patient under treatment. Reports must be made within five days after treatment is started, and on the fifteenth and thirtieth day of treatment; additional reports must be submitted if requested by the Division.

A physician prescribing or furnishing narcotics to a habitual user must also submit a report to the division within five days after first prescribing or furnishing a narcotic. The report must contain the name and address of the patient, the character of the injury or ailment, the quantity and kind of narcotic used and whether or not the patient is an addict. The physician is required to submit any further reports the division may request.

The California Law is unique in thus prescribing the limits of professonal use of narcotics in the treatment of addicts. Most states leave such limits to the discretion of the physician and the standards of treatment acceptable to the medical profession. Thus the Uniform Narcotic Drug Act leaves the limits to the discretion of the physician, circumscribed only by the standards of treatment acceptable to the medical profession.[13]

Administration of the Federal Narcotic Law, the Harrison Act, has according to both witnesses testifying at the public hearings and literature about the problem resulted in a prohibition against a doctor's treating the narcotic addict. Dr. Karl Bowman for example pointed out to the committee that, although the Harrison Act does not in itself prohibit a doctor from prescribing narcotics to addicts, "it would be as much as any doctor's medical standing and medical life would be worth for him to prescribe narcotics in the treatment of an ambulatory drug addict." Such a physician would, according to Dr. Bowman, undoubtedly have charges preferred against him, run the risk of losing his license and his practice.

The Report on Narcotic Addiction of the Council on Mental Health of the American Medical Association had this to say about this problem:

> "There seems to be a certain degree of confusion among physicians concerning their rights and the laws and regulations respecting the management of addicts. There is nothing in the Federal Narcotic Law which prohibits a physician from treating an addict. The law itself merely specifies that the physician may prescribe or dispense narcotics 'in the course of his professional

[13] University of California, Los Angeles, "The Narcotic Problem" *U. C. L. A. Law Review*, Volume 1, No. 4, June, 1954.

practice only.' * * * The Supreme Court has ruled that dispensing of very large amounts of narcotics to addicts without efforts to 'cure' the addict is not proper professional practice. The American Medical Association has, in a sense, defined 'professional practice' in the resolution condemning any system of treatment which places drugs in the hands of the addict for self-administration. These interpretations in no way prohibit efforts at treatment of addicts, but they do limit the way in which treatment can be carried out. In practical terms, they require that withdrawal of drugs be carried out in an institution as the first step in treatment and that the addict not be given drugs for self-administration. * * *

"It may very well be that the regulations concerning dispensing of drugs to addicts have been interpreted and enforced too rigidly. A physician who furnishes an addict a small quantity of narcotics to tide him over until he reaches an institution, or who gives an addict narcotics so that he can arrange his affairs prior to entering a hospital for treatment is in danger of being charged with a violation of the law, despite the fact that he may be acting in what he regards as the best interest of his patient. * * *"[14]

TREATMENT FACILITIES

The narcotic addict in California today who may wish to get medical or hospital treatment for his addiction will find it an almost impossible task. In the addict's home community, treatment facilities are, with the exception of a very few private hospitals or sanitariums, almost nonexistent. He may go to the county jail, a state or the county hospital, where in most instances, he would go through the withdrawal stages with little or no medical assistance. He may not receive medical treatment either in his own home or in the doctor's office. The committee has, during this interim, attempted to learn the extent, nature and effectiveness of the treatment provided in those places where it is permitted under California law.

At the Local Level

The offense of addiction, a misdemeanor, is very largely encountered on the local level and is punishable by county jail sentences of from 90 days to one year. A person convicted of addiction may be placed on probation by the court for a period not to exceed five years. However, a person placed on probation must in all cases be confined in the county jail for at least 90 days. A large proportion of the felony violations of the narcotic laws are also handled at the local level. During 1957 there were 2,291 convictions in California for felony violation of the narcotic laws. Of these, 1,005 were sentenced to state prisons or the Youth Authority. Almost half, or 915 were sentenced to county jail.[15] In addition there are the unknown numbers of addicts convicted of a misdemeanor violation of the narcotic laws or convicted of a nonnarcotic law violation. These unknowns are of particular importance. Earlier it was shown that while the average age of the prison addict is 27, the "average addict" first uses heroin at age 20 and is first

[14] American Medical Association, Council on Mental Health, "Report on Narcotic Addiction," *Journal of the American Medical Association*, December 14, 1957, p. 1971.
[15] State of California, Bureau of Criminal Statistics, *Crime in California*, 1957, p. 82.

apprehended at 21. As with any disease, it must be assumed that the easiest place to stop the disease addiction is at its onset. What, if any attempts are made to rehabilitate this young addict whose early offenses are handled at the local level? Little is known to this committee about what happens to these or the other hundreds of addicts disposed of at the local level. For the most part, it is not known whether they receive medical treatment during withdrawal, psychiatric treatment following withdrawal, or how many addicts return to the use of drugs.

Los Angeles County has the largest narcotic problem in the State in terms of the number of convictions. In 1957, over half of the total number of convictions in the State, or 1,314, were in Los Angeles County. Of these, 788 were sentenced to jail or probation. Testimony at the hearings indicated that there are approximately 500 persons classified as narcotic addicts of one kind or another in the Los Angeles County Jail system at any one time. An addict sentenced to jail or probation in Los Angeles is initially placed in the county jail for a period of from two weeks to 30 or more days. Following their stay in the county jail about half the addicts are sent to the Wayside Honor Rancho and are treated there just as are the other prisoners.

The rest are sent to the Mira Loma Facility where a pilot study on narcotic addicts is being conducted. The addicts at this facility are divided on the basis of a number of personality tests, into three major categories. About 10 percent, felt to be most amenable to treatment, receive group therapy, counseling and guidance from occupational therapists and psychologists. The second group—again about 10 percent, are felt to be least amenable to treatment. The balance of the group is, according to G. M. Gaalken, Chief of the Division of Corrections of the Los Angeles County Sheriff's Department, composed of those "in-between people we know very little about and who don't fall into any particular category on the basis of our tests and interviews."[16] These are integrated into the general institution population where they receive the same group counseling and group therapy as the rest of the population. Group counseling differs from that of the first group in that it is conducted by the officers within the institution—the guards and deputy sheriffs—rather than by the psychologists and therapists as is the case with the first group.

The pilot program at Mira Loma had been in operation less than a year at the time of the committee hearing in May, 1958, so no estimate of its success could be made. Chief Gaalken, however, expressed pessimism about results that could be achieved from an institutional program such as this. "Just as most people feel they have been unsuccessful in curing the alcoholic medically, we feel we are unsuccessful in curing the narcotic addict from this standpoint. It requires something much more than that. We don't know when an addict is 'cured'. If a man stays off the use of drugs for a year, is he cured? If he falls a year later, is this a relapse, or is this a new addiction? We have just about come to the point of believing that if a man could spend his entire lifetime without a recurrence of the use of narcotics, then, and only then is he a 'cured' addict. * * * We feel the problem is a community problem

[16] Subcommittee hearing, May 19, 1958.

and that it must be solved in the community. * * * Emphasis should be placed on stopping this thing from happening in the community, from creating new customers for our business." [17] He added that there is a need to recognize the social problems, such as broken homes, which so often precede addiction.

The San Francisco County Jail has never had a program for the treatment or rehabilitation of habitual drug users. Addicts withdraw from their habits "cold turkey" style, without the benefit of medication, before they are placed in the county jail in San Bruno.

The committee learned of only one program directed towards rehabilitating the narcotic addict ever conducted in San Francisco. That was a pilot study conducted by a voluntary organization, the Northern California Service League (a member of the United Crusade of San Francisco) between February, 1953, and June, 1956.

Alameda County initiated the Nalline program, a method of testing to determine if prisoners on probation have reverted to drug use. This program, discussed in a subsequent section, is felt to be a valuable adjunct to a rehabilitation program. A minimal amount of medical care is given addicts in the county jails during the withdrawal stages. At the county institution at Santa Rita there is no specialized program for addicts. Rather they participate in the same group counseling and same vocational training as do other types of prisoner.

Narcotics Anonymous groups have been established in the Southern California area, one in North Hollywood, one in Downey and one in San Diego. The approach used by these groups, similar to that used by Alcoholics Anonymous, involves a kind of mutually supportive group therapy.

A witness at the hearing discussing the NA program indicated that a person is allowed to come to the first meeting "high." Subsequently, he may not attend if he has used a drug of any kind. The witness reported that "in the last five years our one group in the North Hollywood area, has been able to arrest the addiction of 125 addicts. These addicts have remained 'clean' from three weeks to five years." He estimated that 40 percent of those attending the meetings have not returned to the use of the drugs. One of the greatest needs of these groups appears to be community support, not only of Narcotics Anonymous itself but of the ex-addicts who must have the opportunity to rejoin the community. The same witness testified that the task of NA would be easier if there were less harrassment from law enforcement officials. One group was forced to change its meeting place three times because of such harrassment.

The committee commends the work that these groups are doing and feels additional groups should be encouraged. They appear to provide an invaluable bridge for the addict between the prison or hospital setting and the community to which he must return.

Private institutions are few in number and extremely expensive. Only the 16 private hospitals or sanitariums listed below have been licensed by the Department of Mental Hygiene and approved by the Board of Medical Examiners for the treatment of narcotic addicts.

[17] Committee hearing, May 19, 1958.

Name	*Location*
Alhambra Sanatorium	Rosemead
Braewood Sanitarium	South Pasadena
The California Hospital	Los Angeles
Compton Sanitarium	Compton
Garden Grove Sanitarium, Inc.	Garden Grove
Herrick Memorial Hospital	Berkeley
Kimball Sanitarium	La Crescenta
Las Encinas Sanitarium	Pasadena
Livermore Sanitarium	Livermore
Loran Sanitarium	Los Angeles
Park Sanitarium	San Francisco
Queen of Angeles Hospital	Los Angeles
St. Erne Sanitarium	Inglewood
Vista Hill Sanitarium	Chula Vista
Kings View Homes	Reedley
Edgemont Hospital	Los Angeles

At least four of these 16, even though approved, do not or are not now caring for addicts. Those which do, care for very few and then the treatment for the most part is limited to the medical care and treatment for the addict during the withdrawal stages. Attempts by these institutions at followup psychiatric care have met with a varying, but mosttimes discouraging, degree of success.

Federal Hospitals

An addict from California may apply for admission to the U. S. Public Health Service Narcotic Hospitals at Lexington, Kentucky, or Fort Worth, Texas. (Only the hospital at Lexington has facilities for women.) The research and treatment activities of these two hospitals, and especially Lexington, which is exclusively devoted to the treatment of narcotic addiction, have provided the knowledge on which almost all treatment of drug addiction is based.

Lexington and Fort Worth have 1,574 beds reserved for addicts. In 1955, there were 3,638 addict admissions. About 40 percent of the patients have been through the hospital before and are repeaters. Two-thirds of the patients are voluntary, but only 25 percent of these voluntary patients stay the recommended minimum period of four and one-half months. Hospitalization is mandatory only if the addict has gone to prison for violating the federal laws or if he has received a suspended sentence on the condition that he submit to treatment.[18]

The patient receives a physical examination and psychiatric testing. Physical withdrawal from the drugs has been called the least important and the easiest part of the addict's treatment. It is done in a way which minimizes withdrawal agonies through the use of certain drugs. Following withdrawal, the program consists of physical and vocational rehabilitation and psychotherapy for a selected group. There has never been an adequate followup program to learn the effectiveness of treatment methods, and most estimates of the cure rate are extremely pessimistic. The A. M. A. Council on Mental Health states that the greatest weakness is the lack of continuing medical and social supervision after discharge. "Voluntary patients * * * are likely to return to the same environment and the same conditions which were partly

[18] See Charles Winick, "Narcotics Addiction and Its Treatment, Law and Contemporary Problems, Duke University School of Law, Vol. XXII, No. 1, Winter, 1957, p. 23.

responsible for their addiction. Local social service agencies are frequently resistant to accepting and helping addicts. Even states that have large concentrations of addicts do not have well-organized programs for post-institutional treatment of addiction. There is no provision for continued psychotherapy. It is small wonder, under these conditions, that the relapse rate is high." [19]

While these hospitals do have the facilities and personnel trained in narcotic treatment, there are problems which limit their usefulness to the California addict. The situation is similar to that in New York which was described by a 1958 New York legislative committee as follows:

> "The distance to the hospital, the need to dislocate established patterns of living, the difficulties faced by family and friends in visiting a patient at such a distance, the stigma attached by some elements of the community to having been at Lexington, the lack of money necessary to pay for transportation to Lexington, the time lag between the date of application and the date of admission, and other factors, make it difficult for many addicts to accept the prospect of going there for treatment." [20]

State Hospitals

If there is "reasonable ground" for believing that an addict will benefit from treatment, a judge may commit an addict to a state mental hospital. Provision for commitment of narcotic drug addicts is found in Section 5355 and for habit-forming drug addicts in Section 5404 of the Welfare and Institutions Code. An addict may voluntarily commit himself to a state hospital by noncriminal court action (Sec. 6602, Welfare and Institutions Code). The department says that addicts very rarely do this, however.

Only 73 narcotic addicts and 20 habit-forming drug addicts were in the 10 state hospitals as of June 30, 1957. A further breakdown is in the following table.

TABLE 2

RESIDENT POPULATION AS OF JUNE 30, 1957

	Narcotic		*Habit-forming*	
	M	*F*	*M*	*F*
Agnews	0	1	4	2
Atascadero	1	--	--	--
Camarillo	24	5	1	3
DeWitt	1	--	--	--
Mendocino	--	2	--	--
Metropolitan	10	4	1	1
Modesto	--	1	--	--
Napa	5	2	--	2
Patton	9	1	--	3
Stockton	2	5	--	3
Total	52	21	6	14
Male	52		6	
Female	21		14	
	73		20	

[19] American Medical Associated Counsel on Mental Health, "Report on Narcotic Addiction." *Journal of the American Medical Association*, December 7, 1957, pp. 1835-6.

[20] New York State, Joint Legislative Committee on Narcotic Study, *Second Interim Report*, February, 1958, p. 25.

Although addicts are committed for a period of from three months to two years, most stay for only the three month minimum period. A partial indication of the rapid rate of patient turnover is the following table showing the total number of patients in each of the hospitals during the year.

TABLE 3

TOTAL ADDICTS IN STATE MENTAL HOSPITALS

Year Ending June 30, 1958

	Narcotic drug addicts	*Habit forming drug addicts*
Agnews	13	10
Atascadero	3	--
Camarillo	84	21
DeWitt	9	1
Mendocino	7	5
Metropolitan	40	5
Modesto	6	2
Napa	22	10
Patton	45	19
Stockton	16	13
Total	245	86

According to testimony at the public hearings most addicts are over the withdrawal symptoms when they arrive at the hospital. If needed, however, treatment to ease withdrawal is provided. Addicts are also given necessary care to get them in good physical condition. Because there are so few patients in each of the hospitals a segregated narcotics ward, apart from the question of the value of such a ward, cannot be established. Narcotic addiction is regarded as a symptom of personality disorder and the addict, therefore, receives the same type of psychotherapy as other patients. According to representatives of the department, the prolonged psychotherapy required by the narcotics addict is just not available in a mental hospital system which is overcrowded with more easily treated patients and understaffed as regards the necessary treatment personnel.

Dr. Theo. K. Miller, Superintendent of Napa State Hospital indicated that he did not feel there has been any improvement in the type and effectiveness of the treatment methods. This he attributed principally to a lack of research and post institutional follow up.

Dr. W. A. Oliver, Clinical Director at Napa State Hospital, in discussing the department's program for addicts, said:

> "I don't know whether a three-month stay in the hospital is of benefit to the individual or not. The reason we keep them three months is that this is the legally imposed minimum period of time. From the standpoint of society, I suppose a troublesome psychopath who is kept out of circulation for three months benefits society to that extent. I have no figures to show that three months in the hospital results in any better end result than would three days or three years."

Spadra State Hospital at one time was devoted exclusively to the treatment of narcotic addicts. It opened in August, 1928, with a capacity of 40 patients. This was increased to 90 patients in 1929, but was only 21 when the hospital was finally closed in June, 1941. The

factors leading to its closing as reported by the State Department of Mental Hygiene in letter dated January 2, 1958 were:

1. No program of treatment appeared to cure any substantial number of narcotic addicts.
2. The costs of operating a small separate institution were too high.
3. The then existing law, which provided a minimum confinement of eight months and a maximum of two years, was a handicap as it did not permit release sooner than eight months.
4. Admission was by court commitment only and a considerable number of hopeless cases were committed by the courts.
5. Too many hardened criminals created a serious security problem for a hospital setting.

The reason for the hospital's failure was described this way in another report: "There was a feeling on the part of the personnel that only short-time user of narcotics should be sent to it and that long-time addicts and relapsing addicts should be sent to jail rather than to the hospital. As a result there was a lack of sympathetic attitude toward the patients. Under the circumstances the place was bound to be a failure." [21]

Unfortunately no provision was made for research at Spadra and so, although a great deal was learned about the administrative problems attendant with the operation of such a hospital, little was learned about treatment.

The Department of Corrections

The department operates eight institutions, one of which is exclusively for women. They are the California state prisons at Folsom, San Quentin, Soledad, the California Institution for Men at Chino and Tehachapi, the California Men's Colony at Los Padres, the Deuel Vocational Institution at Tracy, the California Medical Facility at Vacaville and the California Institution for Women at Corona.

When a man is committed to the department, he is first sent to either the Reception-Guidance Center at Chino or the California Medical Facility at Vacaville. Young men are also received at the Deuel Vocational Institution at Tracy. At these centers the newly received inmate is given a medical examination and a variety of tests designed to determine his intelligence, personality, educational achievement and vocational aptitude. These examinations provide the basis for determining the inmate's prison program and his level of custody. Narcotic addicts are sent to the various institutions on the basis of this kind of testing rather on the basis of their addiction.

By the time an addict arrives at one of the reception centers, he is usually over any withdrawal symptoms he may have had.

The term treatment used by the department refers to the broad correctional concept wherein everything that is done, to, for, or with an inmate is considered from the standpoint of its effect on his recovery. The treatment given the narcotic addict is the same as that given any other inmate. All of the institutions utilize group counseling programs

[21] Lawrence Kolb, Medical Director, U. S. Public Health Service, Report on the Needs of California for a Psychopathic Hospital in the Department of Corrections, August, 1944, p. 12.

where the inmates may, on a voluntary basis, meet for group discussion guided by a staff member. These programs are designed to permit and encourage the participants to discuss their situation as prisoners and the reasons underlying their criminal behavior. Although departmental personnel feel optimistic about the values of this type of program and feel that it may be a valuable tool for rehabilitation, it is still considered an experimental program and there is no statistical evaluation to measure its effectiveness.

The treatment program offered by the California Medical Facility at Vacaville is more intensive than that of the other facilities. Group psychotherapy conducted by trained professionals is available for small groups of inmates on a twice-a-week basis. The program is largely permissive, nondirective, and the patients are encouraged to express their feelings as freely as possible. Occasionally a group is made up exclusively of narcotic addicts, but the normal pattern is for their participation in groups composed of other offenders as well.

Dr. A. LaMont Smith, Executive Officer of the Department of Corrections, told the committee that about one-half of the total departmental population is engaging in some form of group counseling. At Soledad a chapter of Narcotics Anonymous has been established. At other institutions addicts may attend sessions of Alcoholics Anonymous.

There is no way to learn the success of the program in rehabilitating addicts. One of the principal roadblocks is again the lack of knowledge as to who the addicts are. The department knows the recidivist rate for those convicted of a violation of the Health and Safety Code, but from the records that have been kept, up until this last year, it does not know which of these violators were actually addicts. Nor do the records show whether the person convicted and imprisoned for burglary or some other non-Health and Safety Code violation is also an addict.

Mr. Fred Finsley, Chairman of the Adult Authority, commented this way about the program:

> "I feel that the treatment we do have available is not adequate. We have group counseling and some Narcotics Anoynmous classes and our observation of these gives us the impression that these are worthwhile. Through these group counseling classes, which enable the addicts to discuss the problems attendant with narcotics use, some appear to be recognizing the emotional and personality problems which contribute to their narcotic use. It looks hopeful but we have no actual proof of this."[22]

A study was conducted by the Division of Adult Paroles for a 15-month period beginning in September, 1952, to obtain information regarding the characteristics of paroled addicts, and to explore the relative effectiveness of different kinds of parole supervision approaches.

One group of parolees was given individual counseling, hourly sessions once or twice a week in the parole officer's office and 11 percent of this group was returned to prison within the 15-month period. A second group was placed in the "field-examination category." The addicts in this group were seen by the parole officer two or more times a month for a 15- to 20-minute period, usually at the addicts

[22] Committee hearing, February 13, 1958.

place of residence. Thirty-two percent of this group returned to prison. The third group was used as a control group. Members of this group were neither allotted counseling time in the office nor examined in the field. This was called the routine supervision group and 46 percent of this group was returned to prison during the total study period. According to Dr. Walter Bailey, who worked on this study, the experience suggests the "feasibility of maximum parole periods so that the opiate addict has the benefit of long-term parole supervision and society has the benefit of long-term protection from the addict. * * * If one can have longer parole periods, with some legal control over the parolee while he is in the community and can subject him to various kinds of supportive treatment as well as supervision, I think it is possible to help the addict handle his relapses when they occur in a way that is not harmful to society or to him. We can help the addict to stay in the community free of drugs for as long a period as possible, and yet retain the legal power to isolate him from the community if necessary." [23]

The California Institution for Women is the only institution in the Department of Corrections responsible for the care and treatment of adult women. It also receives transfer cases from the Youth Authority. The percentage of narcotic addicts is higher than in any other Department of Corrections institution. Miss Alma Holzschuh, Superintendent of the Institution reported that 41 percent of the population were addicted prior to admission, although only 26 percent were convicted of narcotic law violations. At least 98 percent of these addicted women were using heroin, a few were using other drugs and a few, marijuana.[24]

The addicts are usually over the physical withdrawal symptoms, when they enter the institution. They are, however, in poor physical condition. Miss Holzschuh told the committee that "during the first four or five months we try to build them up physically." Beyond this, the treatment program is not radically different for this group than for others in the institution. "Those in the institution are usually seriously maladjusted people. We have no casual offenders, so that they are all in need of intensive therapy."

Treatment consists of group therapy, individual and group counseling. An Alcoholics Anonymous group, which is for both alcoholics and narcotic addicts, holds weekly meetings.

Although there are no statistics as yet to judge the value of the treatment program, Miss Holzschuh stated that "we do feel good results are resulting form this type program. We do have people who have had a very bad habit who have succeeded on the outside."

The Youth Authority

The Youth Authority has no program specifically directed towards the treatment of the juvenile addict either within the institution or during parole. An attempt is made to integrate these addicts with others in the institution. Group counseling and psychotherapy programs similar to those in the Department of Corrections' institutions are used in an attempt to rehabilitate all those in the custody of the

[23] Committee hearing, May 19, 1958. See also Walter Bailey, "The Supervision of Paroled Drug Addicts," *Journal of the National Probation and Parole Association*, January, 1958.
[24] Subcommittee hearing, May 19, 1958.

Youth Authority. The committee was told that there is no definite information as to the value or success of this program.

Followup Care or Outpatient Supervision

There is not one place in the State with an integrated program of hospitalization, psychiatric care and rehabilitation for addicts. There is an almost complete lack of followup care or outpatient supervision on the community level to assist the addict once he is discharged or released from state or federal hospitals. The parole supervision over those released from state prisons or county jails is also inadequate. This failure can nullify any benefits the addict may have received while in any of these institutions. Witnesses testified as to the need for and value of close supervision of the addict returned to the community and emphasized the vital importance of instituting community followup programs.

SOME PROPOSALS FOR COPING WITH THE NARCOTIC ADDICTION PROBLEM

A great variety of solutions have been suggested for helping solve the problem of narcotic addiction. They range all the way from the purely punitive approach to the free dispensing of drugs to addicts. No single solution or simple formula will provide the answer to a problem so complex as this. The Board of Corrections has said that "the narcotic problem will not be controlled until a greater degree of co-ordination, effective enforcement, adequate treatment and public understanding is achieved."

ENFORCEMENT OF NARCOTIC LAWS

To Apprehend the Nonaddict Heroin Profiteer

Better enforcement of some of the existing laws is needed to reduce the supply of illicit drugs in California. At the present time under California law, the big-time seller is not apprehended. Fred Finsley, Chairman of the Adult Authority told the committee that "We get a great many sellers and pushers in our institutions but they are not what you would call big operators. In the 10 years I have been with the authority, we have not had but perhaps half a dozen big operators. * * * The people we are getting in prison are more the victims of the narcotic traffic, not the members of organized crime actually responsible for the narcotics problem." [26]

Several witnesses pointed out that the narcotics problem could be more realistically considered if there were a distinction in the state law between the addict, the addict-peddler and the nonaddict seller. The purely punitive approach has not been found successful in solving the narcotic problem. The addict who sells drugs or commits other criminal offenses to support his addiction is not cured of his addiction by punishment. The nonaddict seller poses an entirely different problem, however, and increased efforts must be made to apprehend him.

Co-ordination of Federal, State and Local Enforcement Activities

The federal narcotics laws are enacted under the federal powers which include the Interstate Commerce power, the revenue power and treaty power. The laws include various provisions relating to the export and import of narcotics, the Opium Poppy Control Act of 1942, and certain laws in the Internal Revenue Code among which is the Harrison Act. The regulation of marijuana is imposed by the Marijuana Tax Act of 1937. The enforcement of the federal narcotics laws is largely the function of the Treasury Department and is chiefly the responsibility of the Bureau of Narcotics within that department. The Bureau of Customs shares in the enforcement of certain laws involving smuggling of narcotic drugs and marijuana into the United States.

[26] Committee hearing, February 13, 1958.

In California, the Bureau of Narcotics Enforcement, Department of Justice, is responsible for enforcing all laws regulating the cultivation, production, sale, giving away, prescribing, administering, furnishing, or possessing narcotic drugs. Under California law regulation of marijuana is included in the general provisions for narcotics. The provisions of the Health and Safety Code conferring authority on the Bureau of Narcotics Enforcement do not provide that such authority resides exclusively in the bureau. Nor have these provisions been so construed in practice. It appears that under the laws governing arrest generally any peace officer or even a private citizen can make an arrest for a violation of a state narcotic law.

Although the California narcotic laws are more extensive as to certain technicalities, the prohibitions against dispensing, transferring, transporting, possessing, or engaging in other transactions involving narcotics are generally overlapping with the federal law. Since in many instances a single offense could constitute a violation of both federal law and state law, there is a vital need for co-operation between federal and state authorities.

There is the practical aspect that determines certain responsibilities since California and its municipalities are limited to their territorial jurisdictions. Otherwise it appears that the areas of responsibility at federal, state and local levels are decided not by the law but by administrative determinations.

During the latter part of 1957, one of the narcotic inspectors of the State Bureau of Narcotic Enforcement was arrested by federal narcotic agents and charged with illegal possession and distribution of narcotics. This arrest of a state agent by federal officials without previously informing the Chief of the State Bureau of Narcotics Enforcement brought charges of a lack of co-operation between the federal and state agencies and seemed to weaken any co-operation between these agencies that had existed prior to the incident. Because of the serious nature of the offense charge against the state official the Attorney General immediately ordered an investigation of the Bureau of Narcotics Enforcement. Soon after this incident occurred, on November 4, 1957, this committee held an open public hearing in San Francisco, at which time testimony was taken from representatives of the Bureau of Narcotics Enforcement, the Department of Justice, the Oakland City Police Department, the Alameda County Sheriff's Department, the San Francisco Police Department and the United States Collector of Customs, on the degree of co-operation that existed between these several agencies. Those that testified at this hearing indicated that the several agencies did co-operate in enforcing the narcotic laws and that through meetings and the exchange of information, even though on an informal basis, they were able to co-ordinate their various activities.

The subcommittee felt however that a more detailed look at the Bureau of Narcotics Enforcement was in order. It contracted with the Legislative Analyst for a thorough study of the Bureau of Narcotics Enforcement. While this study was in progress, the Attorney General's investigation of the bureau continued. The results of his investigation were presented to the subcommittee at three meetings held during March, 1958. Both the Attorney General and the Legislative Analyst found that there were serious shortcomings in the administrative setup

of the Bureau of Narcotics Enforcement. Many of these weaknesses have since been corrected. At the present time, the Bureau of Narcotics Enforcement and the Bureau of Criminal Identification and Investigation are units in the Division of Criminal Law Enforcement. Each of the bureaus is headed by a chief who is responsible directly to the Assistant Director of the Division of Criminal Law Enforcement who in turn is responsible to the Deputy Director of the Department of Justice. The Chief of the Bureau of Narcotics Enforcement maintains his headquarters in Sacramento with bureau field offices in Sacramento, San Francisco, Los Angeles, San Diego and Fresno.

Much of the police activity in narcotics law enforcement involves on-the-street arrests of narcotics peddlers and users. The bureau field offices, located in areas where the narcotics problem is the greatest, provide invaluable assistance to the local law enforcement agencies in meeting these local enforcement problems. However, at the present time very few "large operators," the manufacturers, wholesalers and importers, are being apprehended or prosecuted. Increased efforts must be made to apprehend these persons who are the major perpetrators of the narcotics traffic and this requires the closest co-operation and co-ordination on the part of the many law enforcement agencies on the federal, state and local levels.

THE CLINIC PLAN FOR FREE DISPENSING OF DRUGS

Proposals to legalize the dispensing of narcotics to addicts have been made by those who believe that addiction is spread by the proselyting of new addicts by peddlers interested in increasing their income; that, if narcotics were legalized, the addict would no longer be a criminal and would, therefore, be more amenable to treatment; that illicit traffic would be eliminated because it would no longer be profitable; that the number of addicts would be gradually reduced by treatment and death.

There are serious objections to this plan and even those who advocate it as an eventual solution agree that it would be practical only if it were initiated on a nationwide basis. The Report of the Council on Mental Health of the A. M. A. contains an excellent discussion of the clinic plan and its shortcomings.[27]

PROGRAMS FOR REHABILITATION

A number of "in-between" approaches have been proposed which in general suggest that provision be made for medical care for patients during withdrawal followed by a rehabilitation program to provide therapeutic, supportive and protective services for the addict in the community. Many questions as to the exact nature of a rehabilitation program remain to be answered. These include such questions as whether or not mandatory confinement of the addict is necessary, and if so, for how long; the degree and nature of the post-institutional or post-hospital supervision and the methods of achieving this supervision.

One of the most important aspects of a rehabilitation program is the provision of assistance and support for the former addict returning to the community. Dr. Charles Winick has described the problems facing the ex-addict this way:

[27] American Medical Association, Council on Mental Health, "Report on Narcotic Addiction," *Journal of the American Medical Association*, December 7, 1957.

> "The ex-addict returns to his home * * * under difficult circumstances. He has no money and is back in the same community which helped to spawn his addiction, with the additional handicap of being known as a former addict. Employers are often wary about hiring a person who has been an addict, and since he is often unskilled to begin with, his legitimate employment is likely to be difficult. His family situation is likely to have been strained by his long absence. Social agencies are often reluctant to help the former addict in his attempt at rehabilitation, especially in the vocational retraining which he is likely to need. His nonaddict friends may be suspicious of him, and his addict friends may be all too available." [28]

The reassurance and support from the community which he emphasizes as being of such great importance will require the concerted effort of the many existing community resources. One positive approach to meeting this need is the program of Narcotics Anonymous.

The recent reports of the Council on Mental Health of the American Medical Association and the California State Board of Corrections contain suggestions as to positive steps which could be taken now. Implementation of their suggestions would provide some of the much needed knowledge about rehabilitation. Their recommendations may be seen in Appendix II and Appendix III.

Another approach to the treatment of narcotic addicts was proposed by Dr. Stuart C. Knox, Integrator's Foundation, Los Angeles. His research has indicated that certain enzymes administered to addicts ease the withdrawal symptoms and are very effective in treating the physical phases of addiction in a far shorter period of time than is usually needed for other types of withdrawal treatment. This he considers to be but the first part of a treatment program directed towards the goal of "complete social reintegration" of the addict. His proposed program would include:

1. Hospitalization in approved hospitals for 5 to 10 days according to individual requirements. During this time, the patient would receive enzyme treatment to relieve the withdrawal symptoms of addiction.
2. Continued outpatient care in approved clinics to include:
   (a) Tests twice a week with the symthetic opiate, Nalline, to determine continued abstinence from the drugs.
   (b) Enzyme treatment at the clinic for minor relapses, and arrangement for immediate hospitalization for serious relapses.
   (c) Psychotherapy and rehabilitation counseling.[29]

Although it does not appear that this program in its entirety would be permitted under present California law, the committee urges this type of approach to the rehabilitation of addicts be given further study.

THE NALLINE PROGRAM

A valuable adjunct to parole supervision is a recently developed program involving the use of a drug called Nalline. Using this drug, it is

[28] Charles Winick, "Narcotics Addiction and Its Treatment," *Law and Contemporary Problems*, Winter, 1957, p. 26.
[29] See Appendix IV for the outline of Dr. Knox' proposed treatment program.

possible to determine whether an individual on parole has returned to the use of opiate narcotics. Injections of Nalline may precipitate withdrawal symptoms within 20 to 30 minutes in persons who have been using opiates, depending on recency and extent of dosage.

Nalline (N-Allylnormorphine), although a narcotic, is an antagonist to opium and its derivatives. It acts on the central nervous system in such a way as to abolish certain effects of narcotics, causing a narcotic user to demonstrate certain withdrawal symptoms.

The Oakland Police Department and the Alameda County Sheriff's Office estalished a program in 1956 whereby suspected narcotics users, if they consent, are given Nalline tests. This program has reportedly proved to be invaluable not only in enforcing the narcotic laws but as a tool of supervision in probation or parole work. In Alameda County, willingness to submit to a Nalline test has been made a condition of probation. Its value was described this way by the Oakland Police Department.

> "To further increase the effectiveness of the Nalline program, Oakland Municipal Court Judges agreed to sentence all convicted addicts to from three to five years probation. As a condition of probation the subject is required to report at least once a month, on one day's notice from his probation officer, for a Nalline test. If the probationer fails to pass the test his probation is violated and he is returned to custody. This knowledge acts as a great crutch for the weak personality who cannot stay off drugs on his own initiative. Oakland Police files already reflect the case histories of several heavily addicted individuals who are now reporting regularly for Nalline tests—and who are now evidently able to withstand the temptation to return to their former addiction.
>
> "This therapeutic aspect of the Nalline program has several obvious values: (1) it provides the former addict with the help he needs to stay away from drugs while he develops again into a worthwhile and productive citizen; (2) it cuts deeply into the rates of crimes against property because the addict-thief may now be kept out of trouble on a more or less permanent basis rather than just for the few months while he is serving a jail sentence; and (3) it tends to reduce the total narcotics problem since the seller of narcotics will not stay where he has no market, and as the sellers become more scarce, fewer people will be exposed to unlawful addiction." [25]

The program has been adopted by Orange, Santa Clara, San Diego and Fresno Counties. It is also being used in some areas by the Adult Authority and the Youth Authority.

PREVENTION AND EDUCATION

Any solution of the narcotics problem will require education—both in the schools and of the public—as to the actual facts of the narcotics problem, into the nature of addiction, its causes, dangers and consequences.

[25] Source: Oakland Police Department, "A New Approach to the Detection of Narcotics Addiction—Nalline," 1957.

In the Schools. State law now provides that instruction into the nature of alcohol and narcotics and their effects upon the human system as determined by science shall be included in the curriculum of all elementary and secondary schools. The governing board of the school district is empowered to adopt regulations specifying the grades and courses in which these subjects shall be taught. The law also requires that teachers' training classes in the state colleges devote adequate time and attention to instruction in the best methods of teaching the nature of alcohol and narcotics and their effects on the human system. (Sections 10191 and 20456, Education Code.)

Various school districts have implemented this provision in different ways. The subject matter which by law is limited to the physiological effects of narcotics and alcohol, is often incorporated as a part of another course such as a health class, science, social science or physical education.

At the hearing held by this committee and the Senate Interim Committee on Narcotics, the questions of whether greater emphasis should be given to narcotics education in the public schools and as to whether a statewide program should be adopted were considered. The differences in opinion held by various witnesses indicated that there are basically two opposing points of view regarding education. One maintains that it is dangerous to teach about narcotics as it will arouse some students' curiosity and desire for new experiences. The other stresses the need for such instruction as a preventative measure. Both of these views are presented here in an over simplified form but the difference does indicate a basic problem we face in discussing an educational program. The present understanding of the problem, of the nature and causes of addiction, and of the methods of preventing it, is so limited that there is little agreement as to what to teach, or when and how to teach it.

The difficulties are compounded because as Dr. Walter Bailey pointed out "our present narcotic control situation is based essentially on a prohibition-punishment nationale. At the same time, there is more and more reference to the addict as a 'sick person' with the corresponding stress on his need for medical treatment and psychotherapy. In the midst of all this, there is considerable controversy over theories of causation and methods of treatment, continual perpetration of the 'dope fiend myth' among large segments of the population and general emotional reaction contributing heat but not much light." [30]

The questions relating to the need for additional legislation in this field, and to the need for greater emphasis or a different kind of emphasis on the narcotics problem in the schools should be given additional study not only by the educators but by the medical profession, the law enforcement and public health agencies. Study of the adequacy of school counseling programs for meeting this and other problems of delinquent behavior is of equal importance.

In the Community. Since the causes of addiction are found in the community, preventative measures must be taken at the community level. This was stressed by Dr. Bailey when he indicated that "an education program to be effective in preventing addiction must be integrated into a wider program including the education of adults,

[30] Committee hearing, November 13, 1958.

community planning and development, training and psychotherapy for both disturbed students and the parents, and the general fostering of a more humane and understanding approach to addicts as sick persons.'' [31]

Community action is essential now in those areas where a major part of the addiction problem is known to be concentrated, in the slum or underpriviledged areas of large urban centers which are characterized by other types of delinguent behavior. Solution to the narcotics problem in these areas depends, in large part, on eliminating the same factors responsible for these other types of delinquent behavior.

[31] *Ibid.*

APPENDIX I

WITNESSES TESTIFYING AT COMMITTEE HEARINGS

November 4, 1957

Terry Baum, Deputy Legislative Counsel
Lt. Ted Brown, Oakland Police Department
Albert E. Hederman, Deputy District Attorney, Alameda County
Walter R. Creighton, Chief, State Bureau of Narcotic Enforcement
George S. Maloney, State Bureau of Narcotic Enforcement
Sgt. William Bradley, San Francisco Police Department
Sgt. Joseph Hallisy, San Francisco Police Department
Harold G. Robinson, Deputy Director, Department of Justice
Chester R. MacPhee, U. S. Collector of Customs
Inspector John F. Cerrigan, San Francisco Police Department
Arthur Buck, Office of the Legislative Analyst, State of California

February 13, 1958

A. LaMont Smith, D.P.A., Executive Officer, Board of Corrections
Fred Finsley, Chairman, Adult Authority, Department of Corrections
Theo. K. Miller, M.D., Superintendent and Medical Director, Napa State Hospital
W. A. Oliver, M.D., Clinical Director, Napa State Hospital
Marshall E. Porter, M.D., Director, State Department of Mental Hygiene
Karl Bowman, M.D., Professor of Psychiatry, Emeritus, University of California Medical Center
James Terry, M.D., Medical Officer, Alameda County Sheriff's Office
C. J. Brown, M.D., Chief of Medical Services, Youth Authority
Robert Lee Dennis, M.D., Director of Laboratories, San Jose Hospital
Lt. Ted Brown, Oakland Police Department
Albert E. Hederman, Jr., Deputy District Attorney, Alameda County

February 14, 1958

Stuart C. Knox, M.D., White Memorial Hospital, Los Angeles
S. R. Zalva, Jr., Northern California Service League, San Francisco
Joel Fort, M.D., Berkeley Mental Hygiene Clinic.
M. J. Lowenstein, M.D., Endo Laboratory, New York

May 19, 1958

J. M. Gaalken, Chief, Division of Corrections, Los Angeles County Sheriff's Office
Walter C. Bailey, Ph.D., School of Social Welfare, U. C. L. A.
Roger Roelle, Chairman, Narcotics Committee, Los Angeles Grand Jury
Marcus Crahan, M.D., Medical Director, Division of Corrections, Los Angeles County Sheriff's Office
Miss Alma Holzschuh, Superintendent, California Institution for Women at Corona
Albert Labin, M.D., Los Angeles
Dr. Thomas J. Meyers, The Meyers Clinic, Los Angeles
F. H. Garrett, M.D., Superintendent and Medical Director, Camarillo State Hospital
Philip May, M.D., Clinical Director, Camarillo State Hospital
Robert E. Wyers, M.D., Superintendent and Medical Director, Metropolitan State Hospital
A member of Narcotics Anonymous
Cecil Stewart, California Pharmaceutical Association
E. H. Wiggenhorn, California Pharmaceutical Association
J. Douglas Grant, Chief of Research, Department of Corrections
Stuart C. Knox, M.D., White Memorial Hospital, Los Angeles

May 20, 1958

Roy A. Gustafson, District Attorney, Ventura County
William J. Suytar, Sheriff, Ventura County
V. B. Cummins, Undersheriff, Ventura County

James Alcorn, Chief, Ojai Police Department
Sgt. Edward C. Patton, Oxnard Police Department
Albert Jewell, Chief of Police, Oxnard
Elmer Moorhouse, Chief of Police, Port Hueneme
Capt. Ernest Shaw, Acting Chief of Police, Ventura
Capt. Herbert Dynge, Police Department, Santa Paula
Mrs. Charles Butler, President, Tierra Adorada District, California Federation of Women's Clubs
John E. Storer, Chief, Bureau of Narcotics Enforcement, State of California

November 13, 1958

Norman Graff, M.D., Northern California Psychiatric Society
Joel Fort, M.D., Berkeley Mental Hygiene Clinic
Walter Bromberg, M.D., Central California Psychiatric Society
C. J. Brown, M.D., Chief of Medical Services, Youth Authority
Richard E. Huddleston, Imperial County Education Center
Dr. George Ormsby, State Department of Education
Frank Robertson, M.D., Director of Health Services, San Diego State College
Karl Bowman, M.D., Professor of Psychiatry, Emeritus, U. C. Medical Center
Walter C. Bailey, M.D., School of Social Welfare, U. C. L. A.
Bill Hopkins, Educational Television Channel KVIE
Donald Kitch, State Department of Education

November 14, 1958

Charles A. Branthaver, M.D., Chairman, School Health Committee, California Medical Association
Richard A. McGee, Director, Department of Corrections
Oliver E. Byrd, M.D., Department of Health Education, Stanford University
J. Douglas Grant, Chief of Research, Department of Corrections
Stuart C. Knox, M.D., White Memorial Hospital, Los Angeles
Dr. Dorothy Zietz, Associate Professor of Social Welfare, Sacramento State College
A. LaMont Smith, D.P.A., Executive Officer, Board of Corrections

APPENDIX II

COUNCIL ON MENTAL HEALTH, AMERICAN MEDICAL ASSOCIATION

RECOMMENDATIONS

Improvement of the Care of Addicts

It is recommended that the American Medical Association continue to study and to support reasonable proposals designed to improve the treatment and prevention of drug addiction. Such measures might include

(a) Development of institutional care programs in cities and states with significant problems.
(b) Study of various means to obtain institutional care in states with small addiction loads. One such proposal is for several states to set up an institution which would be operated jointly.
(c) Development of programs for intensive postinstitutional treatment of addicts. Such measures would include supplying of various social services, vocational rehabilitation, and, where possible, psychotherapy to addicts for adequate periods following discharge from institutions. In many instances, available facilities in other programs might be utilized. States with serious problems should develop special programs for addiction.
(d) Development of methods for commitment of addicts to institutions by civil action rather than through actions in the criminal courts. In this connection the council further recommends that where civil commitment procedures can be used, criminal sentences for addicts who are guilty only of illegally possessing and obtaining opiates, marijuana, and cocaine should be abolished. Criminal sentences for illegal sale of narcotics should be retained but persons who are addicts and who are sentenced for such offenses should have the same opportunity for probation and parole as is afforded offenders against other laws. Mandatory minimum sentences for addict violators would interfere with the possible treatment and rehabilitation of addicts and therefore should be abolished.
(e) The council strongly recommends that the policy of voluntary admissions for the treatment of addiction should be continued, extended, and encouraged.
(f) Continue support and expansion of mental health programs. Because of the importance of psychiatric factors in addiction, such programs should eventually have an effect in reducing addiction even though not specifically aimed at that problem.

Support for Increased Research

It is recommended that the American Medical Association support proposals for increased research on the problems of addiction. One of the current difficulties in formulating adequate programs is lack of

knowledge which can be gained only through research. Support should be given not only to "basic" laboratory investigations but also to continuation of sociological studies, and to an intensive program of clinical research based on adequate facilities for following addicts after institutional discharge. Such research might yield results that would be valuable in areas other than addiction.

Clinic Plans

In view of all of the available evidence at the present time it does not seem feasible to recommend the establishment of clinics for the supply of drugs to addicts. This is true for the Eggston resolution and the plan of the New York Academy of Medicine, even though there are many aspects of these plans that could be looked upon with favor. This opinion should be subject to frequent review in accordance with new scientific knowledge that may become available.

Continued Study

It is recommended that the American Medical Association continue to study the narcotic laws with the view of further clarification of the rights and duties of physicians and allied professional persons in the handling of addicts. The phrases in the current law "* * * in the course of professional practice only" and "prescription," remain vague and confusing, despite Supreme Court decisions. Regulations on dispensing drugs to addicts should be eased so that the patients can have a reasonable time to arrange their affairs prior to entering a hospital for treatment. The 1924 resolution of the house of delegates should be revised. Consideration should be given to broadening the resolution to include a plan endorsing regulations somewhat similar to those currently in force in England.

SOURCE: American Medical Association Council on Mental Health, "Report on Narcotic Addiction," *Journal of the American Medical Association*, December 14, 1957.

APPENDIX III

RECOMMENDATIONS OF THE CALIFORNIA BOARD OF CORRECTIONS

The facts which have been gathered, analyzed, and briefly presented in Part I of this report have been helpful in that facts hitherto not known have for the first time been made available as guides for action. The recommendations which follow are based on the foregoing study; the reports of other public agencies including the Bureau of Criminal Statistics of the California Department of Justice, and particularly the Citizens' Advisory Committee to the Attorney General on Crime Prevention.

PROPOSED UNIFIED PLAN OF ATTACK ON THE NARCOTIC PROBLEM IN CALIFORNIA

There are many possible approaches that could be utilized in dealing with the narcotics problem in California. Some obvious steps can be taken under existing laws and with public approval. Enforcement activities can be stepped up in the hope of reducing the supply of illicit drugs. As a border and seaboard state California is particularly vulnerable to smuggling activities. Since the enforcement costs for control of the narcotic traffic in California are directly related to the volume of illegal narcotics entering the State, additional special officers to supplement the work of the federal agencies in this area can help reduce the spread of this traffic.

Stricter supervisory control over the addicted population in the State can be provided. There is an urgent need for exercising continuing control in the community of persons once addicted to heroin. This action would be justified because addicts do commit other crimes, engage in the retail peddling of narcotics, and spread the narcotics habit one to another by a kind of social contagion. This appears, for one thing, to justify placing a smaller number under the supervision of each parole agent than has been found necessary for other types of offenders.

There is a great need for pilot studies to be made for the development of positive treatment programs for the addicted. Research in this area is essential because at the present stage of our knowledge, psychiatric service is the only treatment indicated and this is usually not available. Present treatment is primarily concerned with the emotional problems of the addict which must be dealt with after the initial physical symptoms present during the withdrawal sickness have passed. Additional treatment techniques must be developed capable of application in the care of the majority of victims of this traffic. Most addicts are now receiving little treatment except the punishment of imprisonment and the physical withdrawal pains.

NEED LOCAL PROGRAMS FOR PREVENTION AND CONTROL

Other approaches, in addition to increased enforcement and fact-finding activity, must be adopted. It is important that drug addicts committed to state institutions be subject to control and rehabilitation treatment when possible; however, it should be pointed out that by the

time they are committed to prison a large proportion of these individuals have been addicted for a number of years. It is essential that this disease, like all other maladies, be attacked at its onset.

Preventive measures at the community level are particularly important since much of the problem of narcotic use seems to stem from neighborhood gang associations. There is a need for communities to set up more effective programs for early identification of drug users and to initiate treatment at the earliest possible moment after the first exposure. Such programs must include more than stagnant meditation in juvenile hall or jail in futile hope for penitent rehabilitation. The values from meaningful institutional treatment also will be lost without intensive followup supervision after returning to community life.

CENTRAL STATE AGENCY NEEDED

A central agency of State Government is needed with the continuing responsibility of gathering facts, co-ordinating the programs of the many enforcement and treatment agencies involved at local, state and federal levels, and in brief, giving broad scale, top-level leadership in promoting the efforts to contain and reduce the narcotics evil. Meeting the need for more knowledge is not easy when dealing with this illegal activity so elusively entwined with delinquent behavior. The few facts now being collected are gathered by many agencies, each with responsibilities for only one facet of the complex narcotic problem.

Recommended Action

A special study commission on narcotics should be established within the framework of State Government as soon as possible. There are several methods by which this objective might be accomplished. *Among these are a limited term commission created by the Legislature with membership including the Attorney General, the Superintendent of Public Instruction, and the Directors of the Departments of Corrections, Youth Authority, Mental Hygiene, Public Health, and such other appointees as might seem appropriate.* As a second alternative the Governor could make use of the existing authority provided by Penal Code Section 6028 by creation and appointment of a crime study commission on narcotics. A third procedure might be followed creating an interdepartmental committee without specific statutory authority by means of an executive order.

Whatever action is taken in this regard, there is an obvious need to gather facts and stimulate co-ordination between agencies. Therefore, in any event, such a group should be provided with adequate staff and sufficient funds to meet necessary expenses.

Several areas deserve particular consideration. *Co-ordination* between responsible agencies is hard to achieve and maintain because of overlapping, divided jurisdiction and precedent. Action is needed to stimulate any necessary amendment of basic laws and achievement of more unified direction of the responsible agencies' efforts.

Enforcement of the narcotic laws places responsibility upon city police, county sheriffs, state agents, and officers of several federal agencies. The schedule of penalties for similar offenses varies between jurisdictions. Court decisions have placed restrictions upon enforcement activities. Juries have been reluctant in some cases to find offenders

guilty because of high mandatory minimum sentences. The nationwide and international scope of these problems involve interstate and federal enforcement relationships. These relationships need careful study and evaluation.

Treatment of addicted persons voluntarily seeking help through self-commitment may also need careful scrutiny in order to encourage and make more flexible the admission, care, and proper period of post-institutional supervision. Facilities for this purpose at local and county levels are almost nonexistent with rare exceptions. The State's hospitals and institutions are crowded beyond their capacity. If supervisory and treatment units can be established in strategic locations, consideration should be given to the possibility of some special method of requiring registration coupled with close supervision of all persons with a recent history of narcotic addiction.

Treatment of those individuals *committed* for violation of narcotic laws has also been complicated by the requirement that all persons convicted of specified provisions of the law be retained in prison for mandatory minimum terms regardless of their apparent readiness for release on parole. These mandatory restrictions now apply equally to the heroin addict of several years standing and the youthful offender in possession of two or three marijuana cigarettes.

Educational procedures are needed which will better inform all segments of our society as to the nature and scope of the narcotics problem without biased emphasis upon any of its complex aspects. Facts based on research are needed to accomplish this objective. It is clearly evident that dependence upon fear of punishment alone will not result in containment and control of the problem.

A basic fact must be recognized; namely, that in the present stage of our knowledge, there is no known treatment which will provide the permanent irrevocable cure of the person truly addicted to a narcotic. The more limited goals of controlling the addict and abating the traffic must be accepted.

The narcotic problem will not be controlled until a greater degree of co-ordination, effective enforcement, adequate treatment, and public understanding is achieved.

NARCOTIC LAW CHANGES PROPOSED

The penalties for marijuana and opiate derivative offenses should be separated. This action should be taken because these two classes of offenses represent different degrees of culpability. It would permit a clear understanding of these two problems now confused through inclusion in the same sections of the law.

(Further proposals were made with regard to the penalties for marijuana offenses. In general, it was recommended that such penalties be reduced.)

New Laws Recommended to Establish Narcotic Treatment-control Units

a. The State Department of Corrections and Youth Authority should be authorized to establish narcotic treatment-control units in state correctional facilities, training schools, or as separately administered establishments. Parole agents supervising narcotic addicts

following institutional confinement should have special training and limited case loads.

b. County authorities should be encouraged to establish narcotic treatment-control units to be administered by the appropriate county agencies.

Proposals for Community Action

a. Programs directed to prevention, treament and control of narcotics use should be established in local communities. The experience or results of the state sponsored pilot *narcotic treament-control units* could be made available on a continuing basis for the guidance of such projects.

b. County probation and parole officers supervising narcotic addicts following confinement in local institutions should have special training and limited case loads.

APPENDIX IV

A PATTERN FOR TREATMENT IN NARCOTIC ADDICTION

Stuart C. Knox, M.D., Integrator's Foundation
Los Angeles, February, 1958

TREATMENT PROGRAM

Goal: Complete social reintegration at adult level

Physical Phase

1. Five to seven days of enzyme treatment, in either an institutional or outpatient facility. Attention to diet and rest.
2. Twice-weekly Nalline tests, for one year.

Psychological Phase

1. Followup treatment in outpatient clinic, with regular Nalline tests and return to enzyme therapy, if indicated.
2. Psychotherapy—
   Individual
   Group
3. Rehabilitation training and vocational testing.

Social Phase

1. Furthering mutual acceptance between patients and society.
2. Encouraging regular employment.

FACILITIES

1. Services in appropriate hospitals—general and mental
2. Outpatient clinics, to provide:
   a. Psychotherapy
   b. Medical therapy
   c. Semiweekly Nalline tests
3. Rehabilitation centers, to provide:
   a. Training schools, vocational testing, etc.
4. Public relations services, to provide:
   a. Employer education
   b. Public education
   c. Family relations, etc.

FINANCING

1. Fines, to be paid by all convicted offenders in the program, $10 weekly, for two years; these fines to be allocated to financing of treatment program.
2. Fees, $10 weekly, from all voluntary registrants.
3. Funds from interested public and private agencies:
   a. Grants for initial work from private foundations
   b. Emergency grants from state funds
   c. Local sources—public and private

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REPORT OF THE
SUBCOMMITTEE ON INSTITUTIONAL EDUCATION
of the
ASSEMBLY INTERIM COMMITTEE ON EDUCATION

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March, 1959

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OF THE STATE OF CALIFORNIA

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Chief Clerk

LETTER OF TRANSMITTAL

California Legislature
Assembly Interim Committee on Education
Sacramento, February 16, 1959

Hon. Ralph M. Brown
Speaker of the Assembly, and Members of the Assembly
Assembly Chamber, Sacramento

Gentlemen: Pursuant to House Resolution 271, adopted June 8, 1957, the Assembly Interim Committee on Education herewith submits its final report on Institutional Education.

Respectfully submitted,

Donald D. Doyle, Chairman
Interim Committee on Education

SUBCOMMITTEE LETTER OF TRANSMITTAL

Assembly, California Legislature
Sacramento, February 16, 1959

Hon. Donald D. Doyle, *Chairman*
Assembly Interim Committee on Education
Assembly Chamber, Sacramento

Dear Mr. Doyle: Pursuant to the general authority of House Resolution 271, adopted June 8, 1957, under which you appointed this subcommittee, the Subcommittee on Institutional Education held hearings at Santa Rita Prison on September 17-18, 1957; at Los Angeles on December 2-3, 1957; and at Perkins Youth Authority Reception Center on December 17, 1958. This report and the legislative recommendations of the subcommittee are based on those hearings and independent staff research.

Respectfully submitted,

Dorothy M. Donahoe, Chairman
Subcommittee on Institutional Education

Vernon Kilpatrick
Donald D. Doyle
Carlos Bee
Pauline L. Davis
Edward E. Elliott
Carley V. Porter

2—L-3877

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SCOPE OF THE REPORT

House Resolution No. 271 directed the Assembly Interim Committee on Education to study the subject of educational programs for inmates of state correctional and mental institutions and in city and county penal institutions.

The Subcommittee on Institutional Education was directed by the Chairman of the Assembly Interim Committee on Education to ascertain, study and analyze all facts related to the educational programs for inmates or institutions under the jurisdiction of the Department of Mental Hygiene, for inmates or institutions under the jurisdiction of the Department of Corrections, and for inmates of any city, county, or city and county jail, road camp, farm or other locally maintained penal institution. The committee was directed to report to the 1959 Regular Session of the Legislature together with recommendations for appropriate legislation.

The subcommittee decided to approach the study from various levels of administration of institutional education programs, i.e. Department of Mental Hygiene, Department of Education, Department of Corrections, California Youth Authority, County Sheriff's Offices, City Police Departments, etc.

Under these administrative levels the study generally broke down into specific topic areas. Although applicable topics varied widely according to different institutions, the topics usually included: the status of teachers, plant and other physical facilities, administration, financial support, and benefits gained from various types of educative processes in mental and/or penal institutions.

The subcommittee held five days of hearings in an attempt to glean as much information, knowledge and opinion of interested parties as possible. The subcommittee met on September 17 and 18, 1957, at the Santa Rita Prison; on December 2 and 3, 1957, in Los Angeles; and on December 17, 1958, at the California Youth Authority Reception Center at Perkins, California.

The success of the hearings and this report, which primarily grew out of these hearings, can largely be attributed to the valuable testimony of the many witnesses who appeared before the subcommittee or prepared materials for the subcommittee member's perusal.

FINDINGS

1. Wards of the California Youth Authority are not at the present time permitted to take with them upon their release any articles of handiwork or other finished products fabricated by them during their time in the institution if such products were fabricated from materials purchased with state funds.

2. Patients in state hospitals are also prohibited from taking with them upon their release any items which they made in the course of rehabilitative work if the materials used were originally purchased with state funds.

3. Under legislation enacted by the Legislature in 1953, hospitals, in order to provide adult education programs, are required to contract with local school districts on a full-cost basis.

4. State hospitals, under the jurisdiction of the Department of Mental Hygiene, have found this full-cost basis so prohibitive that no adult education programs are currently being offered in any of the respective institutions.

5. Education programs for minors in state hospitals are being adequately carried on, although a more liberal policy of providing more teachers for fewer students would increase the effectiveness of such programs.

6. Prior to the termination in 1953 of state support for adult education programs in penal and mental institutions, several county, county and city, and city jails maintained active classes for adult inmates, particularly at road camps and farms. The cessation of state support caused the entire program to collapse abruptly.

7. With only several rare exceptions, no adult education programs are now being provided in any city, county, or city and county jail. Local districts and local institutions have found it impossible to maintain such programs under a full-cost basis.

8. Teachers in most state penal and mental institutions are placed in a disadvantageous position by being under civil service rules and regulations. This has caused the institutions great difficulty in the continued recruitment of qualified teachers.

9. The Department of Corrections has found that by allowing flat grants to the Department of Corrections for educational purposes and then allowing the department to contract with public school districts, private schools, or by utilizing their own personnel, a beneficial flexibility has been added to their program which did not exist under previous arrangements.

10. The Department of Corrections is fully satisfied with the present educational financial arrangements and desires to see its continuance.

11. Although adequate research is not yet available to determine the exact value of education in rehabilitative processes, it was generally agreed by all witnesses appearing before the subcommittee that education was a valuable and, in many cases, an essential ingredient in an effective rehabilitative program.

12. Because of a change in job classification and description at the California Youth Authority, Welfare and Institutions Code Section 1121 is no longer applicable.

13. An apparent need exists to establish guidance schools, under local district sponsorship, which would have the responsibility of handling youths who have shown definite trends of predelinquent activities, attitudes, and behavior.

RECOMMENDATIONS

1. Legislation should be enacted to permit an inmate of a California Youth Authority institution to keep for his own use all articles of handiwork and other finished products of a personal nature that he has fabricated.

2. Legislation should be enacted to permit a patient in a state hospital to keep for his own use articles of handiwork, and other finished products of a personal nature, which he has fabricated.

3. Legislation should be enacted which authorizes the Director of Mental Hygiene to establish and maintain classes in academic education for patients admitted to state hospitals, by utilizing Department of Mental Hygiene personnel or by contract with public school districts. Attendance in such classes should not have to be reported to the Department of Education for apportionment purposes.

4. Legislation should be enacted to permit sheriffs to provide classes of instruction, as well as vocational training and rehabilitation, for prisoners confined to county or city and county jails for terms of more than three months with the approval of the county board of supervisors. Such legislation should also require the board of superivsors to provide suitable facilities and equipment for such instruction and training.

5. Welfare and Institutions Code Section 1121 should be repealed.

PROPOSED LEGISLATION

AMENDED IN ASSEMBLY FEBRUARY 18, 1959

CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 248

Introduced by Messrs. Ernest R. Geddes, Bee, Cusanovich, Elliott, Garrigus, Luckel, and McMillan

January 14, 1959

REFERRED TO COMMITTEE ON EDUCATION

An act to amend Section 4018.5 and to add Sections 4018.6, 4018.7, and 4018.8 to the Penal Code, relating to classes of instruction, vocational training and rehabilitation of prisoners in county jails.

The people of the State of California do enact as follows:

SECTION 1. Section 4018.5 of the Penal Code is amended to read:

4018.5. The sheriff may, subject to the approval of the board of supervisors by ordinance, provide for classes of instruction, vocational training and rehabilitation of prisoners confined in the county jail for a term of more than three months.

SEC. 2. Section 4018.6 is added to said code, to read:

4018.6. The instruction and training provided for in Section 4018.5 shall be subject to the prior approval of the State ~~Board of Education in accordance with regulations which it~~ *Department of Education in accordance with regulations which the State Board of Education* is herewith authorized to adopt and shall be under the supervision of the governing board of a school district in the county maintaining such jails pursuant to an agreement entered into between said board of supervisors and the governing board of the school district in the county maintaining such jail.

SEC. 3. Section 4018.7 is added to said code, to read:

4018.7. The cost to the governing board of the school district shall be paid by the county maintaining the jail for which such services are rendered and said amount shall be reimbursed to said county by the State upon application of the county board of supervisors. The application shall be approved by the State ~~Board~~ *Department* of Education in accordance with

regulations which ~~it~~ *the State Board of Education* is herewith authorized to adopt.

The State ~~Board~~ *Department* of Education shall not approve an amount in excess of the amount expended for the salaries of teachers in such classes increased by one-fifth. Salaries of such teachers for purposes of this section shall not exceed the salaries as set by the governing board of the district for teachers in other classes for adults maintained by the district. The total amount approved shall not be more than one hundred fifty dollars ($150) for each 525 hours of attendance during the preceding year in such classes.

The State ~~Board~~ *Department* of Education shall certify the amount approved for each county to the Controller who shall draw a warrant on the General Fund in favor of the county treasurer in the county.

SEC. 4. Section 4018.8 is added to said code, to read:

4018.8. The board of supervisors shall provide suitable facilities and equipment for the purposes of Section 4018.5.

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CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 249

Introduced by Messrs. Ernest R. Geddes, Bee, Cusanovich, Elliott, Garrigus, Luckel, and McMillan

January 14, 1959

REFERRED TO COMMITTEE ON EDUCATION

An act making an appropriation to reimburse counties for certain costs in connection with classes of instruction, vocational training and rehabilitation of prisoners in county jails.

The people of the State of California do enact as follows:

SECTION 1. The sum of _____ dollars ($_____) is hereby appropriated to the Director of Finance out of the General Fund, to be expended in accordance with the provisions of Section 4018.7 of the Penal Code.

LEGISLATIVE COUNSEL'S DIGEST

A. B. 249 as introduced, Ernest R. Geddes (Ed.). Reimbursement of counties for costs in connection with classes in jails.

Appropriates unspecified sum from General Fund to Director of Finance to reimburse counties for instruction, training and rehabilitation of prisoners in county jails.

O

CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 581

Introduced by Mr. Lunardi, Mrs. Davis, Messrs. Masterson, Waldie, Dills, Miss Donahoe, Messrs. Frew, Gaffney, Hawkins, MacBride, and Williamson

(At the request of Department of Youth Authority)

January 21, 1959

REFERRED TO COMMITTEE ON CRIMINAL PROCEDURE

An act to repeal Section 1121 of the Welfare and Institutions Code relating to the administration of institutions for delinquents.

The people of the State of California do enact as follows:

SECTION 1. Section 1121 of the Welfare and Institutions Code is hereby repealed.

LEGISLATIVE COUNSEL'S DIGEST

A. B. 581 as introduced, (departmental) (Crim. Pro.). Institutions for delinquents.

Repeals Sec. 1121, W. & I. C.

Repeals provision providing that at each institution under jurisdiction of the Youth Authority there shall be a director of the department of instruction who shall be well trained in modern school administration and rank as an assistant superintendent.

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CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 633

Introduced by Miss Donahoe, Messrs. Bee, Kilpatrick, and Porter

January 22, 1959

REFERRED TO COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

An act to add Section 6623 to the Welfare and Institutions Code, relating to handiwork of state hospital patients.

The people of the State of California do enact as follows:

SECTION 1. Section 6623 is added to the Welfare and Institutions Code, to read:

6623. Each patient in a state hospital under this chapter shall be permitted to keep for his own use all articles of handiwork and other finished products suitable primarily for personal use, as determined by the superintendent, which have been fabricated by the patient.

LEGISLATIVE COUNSEL'S DIGEST

A. B. 633 as introduced, Donahoe (G. E. & E.). Handiwork of state hospital patients.

Adds Sec. 6623, W. & I. C.

Permits a patient in a state hospital to keep for his own use articles of handiwork, and other finished products of a personal nature, which he has fabricated.

O

CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 634

Introduced by Miss Donahoe, Messrs. Bee, Kilpatrick, and Porter

January 22, 1959

REFERRED TO COMMITTEE ON GOVERNMENTAL EFFICIENCY AND ECONOMY

An act to add Section 1125 to the Welfare and Institutions Code, relating to handiwork of Youth Authority inmates.

The people of the State of California do enact as follows:

SECTION 1. Section 1125 is added to the Welfare and Institutions Code, to read:

1125. Each inmate of an institution under this chapter shall be permitted to keep for his own use all articles of handiwork and other finished products suitable primarily for personal use, as determined by the director, which have been fabricated by the inmate.

LEGISLATIVE COUNSEL'S DIGEST

A. B. 634 as introduced, Donahoe (G. E. & E.). Handiwork of Youth Authority inmates.

Adds Sec. 1125, W. & I. C.

Permits an inmate of a Youth Authority institution to keep for his own use all articles of handiwork and other finished products of a personal nature that he has fabricated.

O

CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 671

Introduced by Miss Donahoe

January 26, 1959

REFERRED TO COMMITTEE ON SOCIAL WELFARE

An act to add Sections 167 and 168 to the Welfare and Institutions Code, relating to the academic education of patients in state hospitals.

The people of the State of California do enact as follows:

SECTION 1. Section 167 is added to the Welfare and Institutions Code, to read:

167. The Director of Mental Hygiene may establish and maintain classes for patients admitted to any state hospital by utilizing personnel of the Department of Mental Hygiene, or by entering into an agreement with the governing board of a school district or the governing boards of school districts under which the district shall maintain classes for such patients. The governing board of a school district may enter into such an agreement regardless of whether the institution or facility at which the classes are to be established and maintained is within or without the boundaries of the school district.

Any agreement entered into between the Director of Mental Hygiene and a school district pursuant to this section may require the Department of Mental Hygiene to reimburse the school district for the cost to the district of maintaining such classes. "Cost" as used herein includes contributions re-

LEGISLATIVE COUNSEL'S DIGEST

A. B. 671 as introduced, Donahoe (Soc. Wel.). Patients in state hospitals.

Adds Secs. 167 and 168, W. & I. C.

Authorizes Director of Mental Hygiene to establish and maintain classes in academic education for patients admitted to state hospitals, by utilizing Department of Mental Hygiene personnel or by contract with public school districts. Defines "cost" for purposes of computing maximum amount which may be paid to school districts for such services. Provides that attendance in such classes shall not be reported to Department of Education for apportionment purposes. Declares legislative intent that amount of support appropriation for such classes shall be calculated in manner prescribed, with provision for increase or decrease based on median salaries of specified teachers as reported by Department of Education.

quired of any school district to the State Teachers' Retirement System, but such cost shall not include an amount in excess of the amount expended by the district for salaries of the teachers for such classes, increased by one-fifth. Salaries of such teachers for the purposes of this section shall not exceed the salaries as set by the governing board for teachers in other classes for adults maintained by the district.

Attendance or average daily attendance in classes established pursuant to this section for patients of institutions or facilities under the jurisdiction of the Department of Mental Hygiene shall not be reported to the State Department of Education for apportionment and no apportionment from the State School Fund shall be made on account of average daily attendance in such classes.

No school district shall provide for the academic education of patients of state institutions or facilities under the jurisdiction of the Department of Mental Hygiene except in accordance with this section.

The Legislature hereby declares that funds for the support of the academic education program for patients of the institutions or facilities under the jurisdiction of the Department of Mental Hygiene shall be provided, upon appropriation by the Legislature, to the Department of Mental Hygiene at the rate of forty dollars ($40) multiplied by the total number of patients which the Department of Mental Hygiene estimates will be in such institutions or facilities on December 31st of each fiscal year, except as provided in Section 168.

SEC. 2. Section 168 is added to said code, to read:

168. The rate specified in Section 167 shall be further increased or decreased in the same proportion as the median salaries for full-time high school teachers in the public schools of this State have increased or decreased since the 1957-58 Fiscal Year.

"Median salaries" as used herein is the amount which the Superintendent of Public Instruction reports will be paid to full-time high school teachers in the public schools of this State during the fiscal year. Such reports shall be based upon information compiled by the Department of Education on salaries of certificated employees in the public schools of this State.

This section applies only to the program of academic education for patients of institutions or facilities under the jurisdiction of the Department of Mental Hygiene.

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THE FULL REPORT

BACKGROUND

Prior to the 1953-54 school year, authorizations by the Legislature provided for the maintenance by school districts of schools or classes in state correctional or mental institutions and in city and county penal institutions.

During this period the majority of the educational programs in state and local institutions consisted of classes for adults. Juvenile Hall Schools were maintained in practically every juvenile hall, farm or camp. Regular high schools were maintained in a number of institutions under the jurisdiction of the California Youth Authority, such as the Preston School of Industry in Amador County and the Los Prietos Camp for Boys in Santa Barbara County.

In 1953, the Legislature, in Chapter 1510, Statutes of 1953, added Section 9707 to the Education Code, which among other provisions prohibited the maintenance of classes for adults by a school district "if such classes are not open to the general public."

Chapter 1510, while it prohibited classes for adults not open to the general public, made provision (Education Code Section 7098) for a two-year period until July 1, 1955, to reimburse school districts for maintaining classes for adults in any state institution for adults or in any city, county, or city and county jail, road camp or farm for adults. Reimbursement was from the State School Fund in accordance with a formula contained in the law.

At the same session, as part of the same measure, provisions were added to the Education Code (Section 9751ff) authorizing school districts to provide special day and evening classes for adults, under contract to any institution, organization or agency. The school district was authorized to contract at full cost for providing the classes. No attendance for such classes could be reported or used in any computation for state apportionment purposes.

In 1955, the Legislature did not re-enact Education Code Section 7098, eliminating on July 1, 1955, support from the State School Fund for classes for adults in state institutions for adults in city, county, or city and county jails, road camps or farms. The requirement that classes for adults must be open to the public prevented the establishment of those classes in such institutions.

In 1955, the Legislature enacted Chapter 1944, Statutes of 1955, adding Section 2054 to the Penal Code, which stated: "It is the intent of the Legislature to continue to provide for the academic education of adult inmates of state institutions and facilities under the jurisdiction of the Department of Corrections." The Director of the Department of Corrections was authorized to establish and maintain classes and to enter into contracts with school districts or private schools. The education program was financed through the budget of the Department of Corrections rather than through the State School Fund.

On November 4, 1955, the Attorney General's Office rendered the following opinion on the question: Are school districts entitled to state apportionments for adult classes taught in city, county, or city and county jails, road camps, or farms within the boundaries of the school district.

"There is no provision for payment of state school funds to districts for adult classes taught in the future in city, county, or city and county jails, road camps or farms.

"It will be observed that the 1953 additions and amendments to the Education Code dealt with state penal institutions, and with such institutions maintained by the several political subdivisions, and no distinction whatever was made between them by the then statutory plan.

"For purposes of this opinion we are assuming the power of a school district to maintain adult classes in state institutions, city, county, or city and county jails, road camps, and farms.

"In 1953, Section 7098 was added to the Education Code (Calif. Stats. 1953, Ch. 1510, cas. 4, p. 3151) to provide that: 'Effective July 1, 1953, *and thereafter* * * *' (emphasis ours) there should be state aid to school districts for adult classes maintained in 'any state institution for adults or in any city, county, or city and county jail, road camp or farm. * * *'

"At the same time, Section 6841 of the Education Code was amended (Calif. Stats. 1953, Ch. 1510, cas. 2.9, p. 3128) to specifically provide for the 'crediting of attendance for apportionments from the State School Fund during the 1954-55 Fiscal Year *and thereafter* * * * (Emphasis ours). Included in the came section was a provision for a 'day of attendance' for 'classes for adults maintained in any state institution for adults or in any city, county, or city and county jail, road camp or farm. * * *'

"Clearly, under the above sections, absent anything to the contrary, school districts would be entitled to state funds on account of adult classes given in state or local penal institutions. (The original time limitation to July, 1955, having been repealed by Calif. Stats. 1955, Ch. 1944.)

"However, both of the provisions above referred to have been substantially altered by amendments. (Calif. Stats. 1955, Ch. 1944, cas. 1, 5 and 6, p. 3575.)

"Section 7098 of the Education Code now provides that: 'For the 1955-56 Fiscal Year, the Superintendent of Public Instruction shall allow each district maintaining classes for adults in any state institution for adults or in any city, county, or city and county jail, road camp or farm for adults during the 1954-1955 Fiscal Year, the total expenses for such classes. * * *'

"Section 6 of Chapter 1944 of California Statutes 1955 provides that the provisions of Section 6841 of the Education Code with respect to the 'crediting of attendance in classes for adults in any * * * city, county, a city and county jail, road camp or farm, deleted by the amendment to such section made by Section 5 of this act, shall remain in effect after the effective date of this act, solely for the purpose of making allowances in the 1955-1956 Fis-

cal Year for average daily attendance during the 1954-1955 Fiscal Year, pursuant to Section 7098 of the Education Code.'

"Moreover, the act was declared an urgency measure by Section 8 thereof, the urgency being reimbursement of school districts during the 1955-56 Fiscal Year for adult classes given in the institutions hereinabove referred to during the 1954-1955 Fiscal Year.

"In enacting Chapter 1944, Calif. Stats. of 1955, the Legislature clearly made provisions for Education classes for adults in state penal institutions through the Department of Corrections, and an appropriation was made to the department to cover the cost. The department through the Director of Corrections, is empowered beginning in the Fiscal Year 1955-56 to accomplish this either by agreements with public school districts, private schools or by utilizing the personnel of the Department of Corrections. Public school districts had been performing this service in the past and during the Fiscal Year 1954-55, and had been empowered to receive state apportionments directly from the State for the service. Under the statutory scheme long in existence, school districts do not receive state apportionments on account of average daily attendance until the fiscal year following the attendance of classes. Therefore, the Legislature provided in Chapter 1944, Calif. Stats. of 1955, that school districts which conducted the adult classes in question during the Fiscal Year 1954-55 would be reimbursed with state apportionments in the Fiscal Year 1955-56.

"However, while carefully providing for adult classes for the Fiscal Year 1955-56 and thereafter, for inmates of state institutions as above explained, the Legislature by Chapter 1944, Calif. Stats. of 1955, made no provision for future state apportionments on account of classes in any city, county, or city and county jail, road camp or farm for adults, other than for reimbursement for such classes in 1955-56 on account of classes held during 1954-55. Whether this was an oversight or deliberate we do not know, but the provisions of the legislation are so clear as to deny debate."

Since July 1, 1955, with the exception of classes maintained under the contract with the Department of Corrections, school districts have not been engaged in maintaining classes in state or local institutions for adults. The education programs in state and local institutions for minors have continued to be maintained. Departments in State Government and local agencies have not contracted with school districts under the full-cost provisions now existing in the Education Code.

In most of the institutions for minors, with the exception of the institutions for minors maintained by the Department of Mental Hygiene, the authorization for them appears to be adequate.

COMMITTEE STUDY

As a part of the subcommittee's initial investigation into the matter of institutional education, two questionnaires were prepared by the subcommittee staff and sent to various individuals both within and outside the State.

Questionnaire No. I was largely an opinion questionnaire which was sent to approximately 755 individuals and institutional officers within

the State of California. By September 5, 1957, 31.4 percent of the questionnaires had been returned. In light of the general nature of the questionnaire and the rather broad mailing to which it went, the percentage of return, while not high, was considered adequate.

Questionnaire No. II went largely to out-of-state institutions. Rather than being an opinion questionnaire, it dealt largely with the matter of factual data as to the systems in use, the variety of systems and the arrangements for institutional education in the states to which the questionnaire was sent.

Approximately 48 copies of Questionnaire No. II went to institutions and officers of institutions in 12 states. The replies to this questionnaire were naturally more limited. Some 14 replies were received, almost all of which showed evidence of thoughtful and subjective opinion, as well as additional comments which proved highly enlightening and useful.

With the assistance of the Office of the Legislative Analyst the questionnaires were tabulated and briefly analyzed wherever possible. The results and conclusions of this tabulation were presented to the subcommittee at its first hearing on September 17, 1957. This survey, and the opinions expressed therein, constituted a basis for further subcommittee study conducted through later hearings and independent research.

The tabulations of Questionnaires Nos. I and II, with pertinent comments whenever applicable, are presented below.

RESULTS OF QUESTIONNAIRE NO. I

(Opinion Survey directed primarily to individuals in California)

Number of questionnaires mailed	755
Number of replies received to September 5, 1957	239
Percentage return	31.4
Official position of those replying:	
Probation officers	28
District attorneys	31
City attorneys	19
Judges, superior courts	34
Judges, district courts	18
Judges, municipal courts	8
District and county school superintendents	19
City school superintendents	16
Sheriffs	23
Police chiefs	32
State institutions and departments	4
Unsigned	7
Forms returned with no answers	7

Question No. 1

Should inmates of the following types of institutions be provided educational opportunities?

	Yes	*No*
Adult state prisons	224	6
Youth authority institutions	231	1
Female correctional institutions	214	2
County jails (terms of three months or more)	100	119
County farms (terms of three months or more)	107	108
City jails (terms of three months or more)	87	126
Mental institutions	161	31

(A) What Type of Education?

Approximately 175 replies were received to this question and the general opinion appeared to be that in city and county jails and in county farms, where the sentences are of relatively short term, most were inclined to question the necessity for formal educational classes. In some cases the rehabilitation education might take a very short length of time and some formal education might result in the individual's coming back to society a better citizen than he would be if such were not available. In cases where short sentences were involved, time would not permit for any really significant education. This is related to question No. 7 as both ask what type of education would be best generally for inmates. Question No. 7 is answered by figures and most replies to Question No. 1 (a) are answered in generalities. Basic education and vocational training appear to have priority.

Typical Comments

"Type of education would necessarily depend on the age of the individual, his capacity, his aptitude along particular lines, his interest."

"According to basic needs of the inmate with rehabilitation and citizenship stressed."

"In whatever phase of a general education the inmate appears deficient."

"Probably basic education with the possibility of expanding to technical trade courses."

"To obtain maximum benefit for the individual as well as for society, educational opportunities at correctional or detentional institutions should be patterned to fit the needs of the individual."

"Education provided in any institution should be of such a nature that it will enable the inmate to return to society better equipped to earn a living and adjust to the pressures resulting from having been institutionalized. It seems questionable whether great expenditures should be made for the education of short-term inmates unless it appears that the benefits derived from the educational program will assist materially in re-equipping the individual to earn a more adequate livelihood for himself and his family. It appears to me that a good group therapy program for the short timer is more essential than an academic program."

Question No. 2

Should education programs in institutions be administered by the Education Department, the correctional institution itself or other agency?

Department of Education	94
Correctional institution	73
Both	38
School district	7
Department of Education and school district	6
Other agency	5

Question No. 3

Should teachers and instructors be accredited by the State Department of Education?

Yes—187. *No*—43.

Question No. 4

Should teachers and instructors have tenure and other employee benefits modernly available to public school teachers?

Yes—159. *No*—63.

Questions No. 3 and No. 4 were answered in practically every case without comment. One comment is worthy of note, as follows:

> "This question cannot be answered categorically. It is possible that an employee of a correctional institution doing education work could have within that institution protection of retirement and civil service protection that would be equal to teacher tenure. However, if the people are to be drawn from the same field that teachers are hired by public school districts, they probably should be given like benefits. There is a scarcity of teachers and tremendous competition for the able talent that is available. Certainly the correctional institutions should get the very best talent available to do the teaching and probably would have to offer equivalent and transferable benefits if they are to secure their fair share of the trained teaching talent available."

Question No. 5

Should financing and administration of institutional education be from the budgets of the Education Department or budgets of the school districts in which the institution is located?

Department of Education	147
School district	18

(A) If other than those mentioned, which one in your opinion?

Institution	40
Department of Education and institution	13
Department of Education and local schools	15
Department of Education and Department of Corrections	1
Special subsidy program	1
Special state agency	1
Centralized county department	1
Prison personnel	1

(B) Who should be responsible for curriculum planning and study programs?

Department of Education	69
Institution	49
Department of Education and institution	52
Department of Education and local school district	14
Local school districts	10
Adult Authority or Youth Authority	5

Most of the answers to Question No. 5, (A), (B), were made without comment. The majority of the replies were of the opinion that the State should not only bear the cost of the program but should also be responsible for curriculum planning and study programs.

The only reply received that covered this subject thoroughly, both as to administration and financing, read as follows:

"Basically, the administration of the program must be under the correctional institution. I see no particular merit in assuming that all matters educational must come under the official educational agencies. However, if requirements for high school graduation or courses which have standard coinage in education are involved, the standards of the State Department of Education should be met.

"In answer to the question as to whether the Department of Education or the school district should finance and administer the institutional education, it would appear to me that neither of the choices offered is the best plan. If the institution runs the educational program, the funds should be in the institution's budget, not in the budget of the local school district or the State Department of Education. If the local school district is asked to come into the institution and conduct the program, then the funds should be made available to the local school district. I see little merit in trying to set up a statewide system administered under the State Department of Education to carry on an educational program in correctional institutions.

"The planning of rehabilitation education in a correctional institutional should be a part of the function of the officers of that institution. However, if the program is intended to meet normal educational requirements, the requirements for high school or elementary school graduation should be observed and in that sense they would be set by local school districts and by the State Department of Education. In the final analysis, the program for each individual would have to be devised by those who are in a position to give study to his case."

Question No. 6

In your opinion and based upon your knowledge, should education programs be planned only to re-equip inmates to enter society upon discharge?

Yes—134. *No*—40.

The question appeared to some to be inconsistent and, judging from replies, not thoroughly understood. It is accepted that a program of education and rehabilitation is intended to re-equip the inmate to return to society a better citizen.

Question No. 7

Based upon your knowledge and experience, what types of educational programs would be best generally for inmates?

	1st	*2d*	*3d*	*4th*
(A) Basic education (3 R's)	69	15	9	9
(B) Refresher courses of courses taken prior to commitment	7	27	24	25
(C) Retooling of crafts and skills	29	41	30	4
(D) Advance education (8th grade and up)	5	22	31	36

No preference: 126

Only 96 of the replies received answered this question. The combinations were extremely varied. It would appear, even from the small response to this question, that a combination of basic education and retooling of crafts and skills holds priority.

Question No. 8

Other comments on the program generally.
Of the replies received, 133 had no other comments.
Excerpts from some of the pertinent replies:

"A very worthwhile project to pursue toward active practice."

"On a county level I feel schooling should be restricted to basic education."

"Academic education for persons over 18 should be largely, if not entirely, conducted upon a correspondence basis."

"It might be noted that before we go overboard for educating inmates of our state institutions, the State's first obligation is to the children who do not have educational facilities because of shortage of finances. Too many of our children have classrooms in poorly lighted, poorly ventilated quonset huts. Aside from this aspect of the problem, let's not make our penal institutions too attractive."

"This is a very worthwhile program, which should be given legislative support and adequate financing since all of society has a stake in the rehabilitation of those persons who, for one reason or another, transgress our laws."

"My experience is that the trouble makers are usually the poorer mentally and cover their inadequacies by revolt against authority. It would seem that basic would be more important that on a high school or vocational level."

"A refresher course in basic education should be helpful in most cases. A criminal who is dumb enough to land in prison is too dumb to profit by higher education, with its frills."

"Program should be minimum but enough to give interest. A broad program would be of prohibitive cost and doubtful value."

"Greatest problem I see is procurement of sufficient adequately prepared teachers."

"Don't let 'institutional education' grow into a 'large' system only for the benefit of those in it—let it be subject to those in the correctional field."

REPLIES TO QUESTIONNAIRE NO. II

(Factual Data Survey directed primarily to institutions outside California)

Replies to this questionnaire were received from:

Director of Education, State of Florida;
U. S. Public Health Service Hospital, Fort Worth, Texas;
Department of Mental Hygiene, State of New York;
Department of Correction, State of New York;
Department of Public Welfare, State of Illinois;
Department of Institutions and Agencies, State of New Jersey;
Department of Justice, State of Pennsylvania;
Director of Education, State of Iowa;
Director of Education, State of Michigan;

Bureau of Prisons, U. S. Dept. of Justice, Washington, D. C.;
Department of Welfare, State of Kentucky;
Department of Youth Authority, California;
Department of Mental Hygiene, California;
Division of Mental Health, State of Florida, returned questionnaire unanswered as they were of the opinion that it did not apply to their program.

Question No. 1

What type of educational program are you now conducting in your state institutions, city, county or city and county jails, farms or road camps?

Refresher courses	5
Retooling (skills and trades)	6
Basic education (3 R's)	13
Skill and trade training	10
Other	6

Among the "other 6," Florida teaches advanced education (high school and above), New York gives orientation courses, Pennsylvania teaches high school and commercial courses, Kentucky has an on-the-job training program, Iowa has a complete accredited grade and high school course, and California Youth Authority has an eighth grade through twelfth grade program.

Questions Nos. 2 and 3

(2) Subjects taught?
(3) Crafts taught?

So many factors enter into this category that any figures or tabulation would give a rather distorted picture. Inmate population and legislative appropriations would be a principal factor. This can best be illustrated by the States of Florida and New York.

Florida uses inmate instructors; has a limited budget; institutional vocational training in penal institutions has just been initiated with funds provided in the state 1957-58 budget; the subjects taught are high school subjects; and the only craft taught is printing.

New York State instructors are certified by the Department of Education; have benefits such as tenure, retirement, etc.; a budget of approximatly $865,000 for institutional education; 48 vocational courses; 17 courses in arts and crafts; 6 in commercial education; 41 different cell study and correspondence courses.

The information furnished by the State of Illinois covers that state's mental institutions only. All of the states from which we have received replies teach academic, vocational or social education. Crafts are taught in all of the states with the exception of the State of Iowa and the California State Department of Mental Hygiene. Practically all of the states listed have classroom instruction and workshop. With three exceptions, instruction in the use of business machines is taught.

Question No. 4

Class hours?

All the institutions listed have daily classes and in one state, Kentucky, night classes are held three nights a week.

Question No. 5

Curriculum planning and responsibility for teachers' schedules, working hours, etc., is under which department?

Florida	Department of Education
USPHS, Texas	Department of Education
New York	Department of Education
Illinois	Department of Education
New Jersey	Department of Institutions and Agencies
Pennsylvania	Department of Education
Michigan	Department of Education
U. S. Bureau of Prisons	Department of Education
Kentucky	Department of Education
Iowa	Department of Education

New York and California have education departments within their own departments.

(a) Are teachers certified by Department of Education?

In all states "yes" with the exception of Florida where they use inmate instructors.

(b) Do teachers and instructors have benefits such as tenure, retirement, etc.?

In all states "yes" with the exception of Florida where they use inmate instructors.

Question No. 6

What state agency budget is responsible for teachers' and instructors' salaries and administration services?

Florida	Inmate instructors
USPHS, Texas	Does not apply
New York	Department of Corrections
New York	Department of Mental Hygiene
Illinois	Personnel Department
New Jersey	Department of Civil Service
Pennsylvania	Bureau of Correction
Michigan	Department of Corrections
U. S. Bureau of Prisons	Department of Justice
Kentucky	Department of Welfare
Iowa	Board of Control
California Youth Authority	Youth Authority
California Department of Mental Hygiene	Department of Mental Hygiene

Question No. 7

What institutions within your state conduct education classes?

1. State penal institutions	10
2. State mental institutions	6

Question No. 8

From your experience, which type of program is most important in the education of inmates?

	1st	*2d*	*3d*	*4th*	*5th*
(a) Retooling or refresher	1	--	2	3	1
(b) Basic education (3 R's)	7	2	--	--	--
(c) Advanced education such as high school or above	2	2	5	2	--
(d) Skill and trade training	1	7	1	1	--
(e) Sciences	--	--	--	1	6

If more than one is considered essential in your opinion, check the two most essential:

(b) and (d)	7
(c) and (d)	3
(a) and (b)	1
(b) and (c)	1

Question No. 9

How long have you operated educational programs in your institutions?

Florida	21 years
USPHS, Texas	6 years
New York (Department of Corrections)	20 years
New York (Department of Mental Hygiene)	20 + years
Illinois	4 years
New Jersey	50 + years
Pennsylvania	16 years
Michigan	20 years
U. S. Bureau of Prisons	25 years
Kentucky	10 years
Iowa	4 years
California Youth Authority	14 years
California Department of Mental Hygiene	10 years

Question No. 10

Have you experience figures as a result of these programs as to percentage of recommitments? If so, what percentage has education reduced your recommitments?

None of the states replying can furnish this information.

Question No. 11

Is education a factor in equipping inmates to resume their places in society?

All states replying to questionnaire answered in the affirmative.

Comment briefly:

Florida	Many of the repeaters are illiterate or those without a trade to work at.
USPHS, Texas	The learning to read and write, the learning of a skill, the achievement of a high school diploma, or any other advancements in learning are important factors in the individual's development of a sense of personal worth, self-esteem and personal satisfactions. This is one important aspect of the patient's rehabilitation program and is regarded as a supportive factor in the patient's overall treatment program.
New York (Department of Corrections)	More often than not inmates are poorly equipped educationally to function as good citizens. Relatively few of the younger ones are sufficiently trained vocationally to earn a living. We feel that if we can be instrumental in breaching the gaps in knowledge and skills, the chances for success on release are better.
New York (Department of Mental Hygiene)	Our goal is to train our patients to participate in and contribute to whatever society they will live in. For some, it will be the world as we know it; for others, the society of the institution. Our overall

	aim is total adjustment of the individual on whatever level of accomplishment he may attain.
Illinois	No comment.
New Jersey	In New Jersey it is believed that a successful rehilitative process requires those facilities which will enable offenders to learn and/or relearn facts, skills and attitudes which are required to live and compete successfully in the community. The emphasis in New Jersey of recent years has been in the field of learning and developing socially acceptable attitudes.
Pennsylvania	A considerable number of our inmates continue their education after release by attending high schools and colleges. Correspondence courses started here are usually continued. Frequent requests are received from former inmates asking for a transcription of high school credit earned while here.
Michigan	We have learned by experience that those who leave correctional institutions with training are better prepared to make adjustment on parole.
Washington, D. C.	No comment.
Kentucky	Since education has been my life work, I feel that it makes a great contribution to rehabilitation. We simply do not do enough along this line in our institutions.
Iowa	Convicts have one thing in common: a lack of education. It also helps them to readjust outside.
California (Youth Authority)	All Youth Authority wards under 16 years of age reenter public schools. The Youth Authority education program is designed to make this transition easier for the ward and to keep him from losing his educational privileges. It is essential that we follow this program and without it, we could not anticipate continuing rehabilitation.
California (Mental Hygiene)	No comment.

Question No. 12

Other comments on the problem generally?

Florida	No comment.
USPHS, Texas	Type of hospital. The U. S. Public Health Service Hospital in Forth Worth, Texas, specializes in the treatment of patients suffering from various types of emotional disorders. Some of our patients have become addicted to narcotic drugs and come, or are sent, to the hospital for treatment on a voluntary basis, with state probation or commitments, or with federal probation or sentences. Some patients are hospitalized because of other emotional disorders. In this group are patients from the Armed Services, the Maritime Service, the Veterans Administration and dependents of the Armed Services personnel. Some of these patients are on a voluntary status, while others are committed by the courts.
New York (Department of Correction)	It is impossible to answer satisfactorily some of the questions because in the final analysis attention must be focused on the needs, interests and abilities of the given inmate if we are to do educational job well.

	For an illiterate inmate the greatest educational need is to help him to become literate. For the inmate with a functional knowledge of tool subjects perhaps his greatest need lies in the area of vocational education. In many other instances social education or the development of a new sense of values and attitudes is the single most important education need. I am convinced after almost 20 years experience that providing mass education that loses sight of the individual has comparatively little value in a correctional system.
New York (Department of Mental Hygiene)	The problems generally are: difficulty obtaining trained personnel; salary scales; need to be recognized as regular public schools by the state education department.
Illinois	Question 5. Mental hospital program is the responsibility of assistant deputy director—rehabilitation. In schools for the mentally retarded, programs are directed by the educational supervisor.
New Jersey	No comment.
Pennsylvania	No comment.
Michigan	We are constantly receiving letters from ex-inmates and parole officers which justify our opinion that education is a factor in equipping inmates to resume their places in society.
Washington, D. C.	No comment.
Kentucky	Education and all professional services in institutions should be supported by special budgets administered from the central office of the department or agency. Whenever these funds are controlled by institution heads, all professional services are slighted. I have had full opportunity to observe this during 10 years service. In our state institution, heads are political appointees and seldom measure up to control of professional services.
Iowa	Education is *one* of the most (or *the* most) valuable rehabilitation weapons we have in our battle with recidivism. And we have the men out in society to support our belief in college, business, etc. A little money spent on education inside prison walls can produce gratifying results.
California Youth Authority	No comment.
Mental Hygiene	No comment.

DEPARTMENT OF EDUCATION

A high percentage of inmates in the city and county jails and in the state institutions do not meet the educational requirements of the present day, according to witnesses from the Department of Education in their appearances before the subcommittee.

The Department of Education believes it is good business for the State of California to provide educational opportunities in order that a greater number of inmates, most of whom are citizens, may make more satisfactory adjustments upon returning to society as workers, parents and acceptable neighbors.

The department presented the following recommendations in regard to educational programs in state correctional and mental institutions.

1. The education programs should be operated by school districts, preferably the district in which the institution is located. Operation of the program by a school district will insure the use of teaching personnel certificated to teach in California, assure the granting of credits, diplomas, and proper recognition of educational achievement.

2. The program offered should be subject to the approval of the Department of Education to assure quality of programs to meet the needs of the persons served and to assure that adequate administration, supervision and counseling services are provided. This approval should be in accordance with regulations that the Department of Education should be authorized to adopt.

3. Legislation enacted should provide specific guide lines to determine which inmates of the state and local institutions should be served. The Department of Education felt service to short-term inmates was a waste of time and funds.

4. Legislation enacted should clearly specify that the program offered is to be educational and not recreational or therapeutic in nature.

5. Legislation enacted should authorize state and local agencies to contract with school districts to provide educational services.

6. Legislation enacted should provide for full or partial state support as the policy is determined. Such state support should be apportioned by the Superintendent of Public Instruction to the school district operating the program. Should the legislative policy provide for less than full support, provision should be made to provide partial support from the state agency budgets or from local agency taxes as the case may be.

7. Legislation enacted should provide state support for these educational programs directly from the State General Fund rather than through the State School Fund. In so doing, the obligation on the State General Fund will be less as there will be no obligation to support through average daily attendance the several functions that are supported through the State School Fund. These functions are: (1) the county school service fund, (2) excess costs of the education of the physically handicapped and the mentally retarded minors, (3) pupil transportation, and (4) apportionments for growth. Support by this method can be limited to the actual cost of the programs in question or to a lesser amount if the Legislature desires to promote a matching program.

8. Legislation enacted should clearly specify the degree and amount of support that will be provided from state funds. This is necessary in order that school districts and other state and local agencies with which contracts may be drawn may have a firm basis on which to reach an agreement.

Dr. Ron Cox, Assistant Division Chief of School Administration, State Department of Education, in presenting the department's viewpoint before the subcommittee, explicitly pointed out that mental hospitals present a different type of problem than the penal institutions. The rehabilitation of the mentally ill requires education and therapy. There is a thin line between what is educational and what is therapy.

The educational agencies are better equipped, he said, to provide an educational program than a therapy program.

Representatives of the department stated that as far as they were concerned the right of a department to contract for specific services from a local school district was already in the law. However, it was pointed out that this particular section of the law could be and was interpreted differently by different county counsels. The department reiterated that it was wholly in favor of allowing the Department of Mental Hygiene to contract for the services which they desired.

DEPARTMENT OF CORRECTIONS

In a complex, technological world a practical, working academic education is required for successful adjustment. No matter how skilled an employee may be, he has great difficulty in holding a job if he cannot read, understand instructions, or make elementary computations. Yet only 2 percent of the prisoners received by the Department of Corrections in 1955 had finished high school. Although the median age was nearly 30, more than 6 percent could not read or write. The median level of educational achievement was the seventh grade.

The ultimate goal of the education program in the correctional institutions, according to Mr. Richard A. McGee, Director of Corrections, is the satisfactory adjustment of the released prisoner as an acceptable member of free society on his job, in his home, and in his community. A similar purpose is also served by the program in its contribution to the satisfactory adjustment of the prisoner during his period of institutional incarceration.

The role of correctional administration is to bring to bear, in the process of rehabilitation, the best that is known in all the professional disciplines dealing with human behavior. The ability and opportunity of the individual to make a living when he has been discharged from a state institution after having taken vocational work is considered a vital function.

Since the majority of the inmates committed to the custody of the Department of Corrections are lacking in both academic and vocational training the department, in connection with the State Department of Education and the local school districts, has established an educational program designed to meet the above objectives.

Educational programs offered in the various institutions are planned to meet inmate needs for academic, vocational, social and cultural training. Courses offered are basic and the curriculum is practical. The amount of financial support provided for education and inmate participation in educational programs, as might be expected, varies widely, according to institutional need. For example, approximately 60 percent of the inmate population at the Deuel Vocational Institution for young offenders participates in educational programs as compared to less than 25 percent of the population at the California State Prison at Folsom.

In general, the educational programs strive to meet the following objectives:

(a) To guide and assist each inmate to earn his living better as a member of the community society.

(b) To provide an opportunity for the illiterate inmate, if capable, to achieve at least a minimum level of education through the fifth grade, and for others with sufficient capacity to advance toward graduation from the elementary or secondary schools; or to their highest capacities.
(c) To assist the inmate to make profitable utilization of his off-duty time during his stay in the institution through outdoor interests, hobbies, reading of good books and assistance in artistic and musical appreciation.
(d) To develop a better understanding of government and its functions, as well as more appreciative attitudes toward the duties and rights of the citizen in democratic society.

Studies made by the Department of Corrections reveal a major portion of the California prison population consists of men and women who are, as a group, educationally handicapped, unskilled vocationally, maladjusted socially and underprivileged culturally and economically. Further study reveals the proportion of illiterates, of unskilled laborers, of persons with questionable recreation outlets, and of persons with limited cultural interest is very high.

Since most inmates have received much less academic education and vocational training than they are capable of achieving and using, efforts are made during the classification process to arouse the inmate's interest in the educational program of the institution.

The academic educational program includes classes by grades one through twelve; with proper counseling, use is made of the University of California Extension Service on subjects beyond the high school level.

Support of the institutional academic educational programs by local co-operating school districts has provided a staff of fully qualified, credentialled, academic teachers. It also provides a method for issuing elementary and high school diplomas through these districts. Consequently, it is possible for the inmate to acquire a diploma of graduation which is readily accepted without stigma by educational authorities and the general public.

A summary of diplomas and certificates issued by the institutions of the Department of Corrections through local co-operating school districts and the State Department of Education for the school year, 1956-57, is as follows: 731 elementary diplomas; 361 high school diplomas; 1984 certificates of course completion; and 903 completed correspondence courses.

The vocational training program has been carefully organized and planned to attain specific educational and employment objectives. The training programs are developed in conformance with carefully planned trade analyses to meet inmate, institutional and community needs.

Some 500 outstanding state leaders in trades and industry have volunteered their services and are assisting the program through membership in various institutional trade advisory committees. In addition, professional assistance has been given to the programs by numerous state agencies.

Work and training progress reports are maintained as an integral part of the inmate's record and are extensively utilized for employ-

ment placement. Instructional materials, aids, and projects are developed and used in conjunction with normal production operations. Four or more hours of related trade instruction is provided weekly in conformance to State Department of Education and Division of Apprenticeship recommendations.

Special emphasis is placed on integrating the vocational training programs with institutional maintenance, housekeeping and feeding, thus providing organized training at only nominal additional cost.

Individual vocational training recommendations for inmates are made by the Reception-Guidance Centers. These recommendations are based upon various aptitude, interest and intelligence tests. These are further conditioned by the inmate case record, individual interview and the expressed trainee interest. A sound program of trainee selection and assignment has been developed.

A special study was made by a Research Sociologist at the University of California at Berkeley, of the differences observed between 100 parole violators selected at random from Folsom Prison and 100 Folsom nonviolators selected at random. The conclusions indicated: (a) the nonviolators made much greater use of educational opportunities in prison than did the violators, (b) a significant number of the nonviolators learned trades in prison which they followed while on parole but not one of the violators did so.

Studies made by Robert P. Feigen, Correctional Classification Officer IV, California Institution for Men, of 100 inmates selected at random and having acceptable trade skills acquired in the various vocational training programs at that institution demonstrated that the violation rate for vocational trainees of acceptable competency was approximately one-half the mortality rate for untrained institutional parolees in general.

Mr. Glen W. Wilson, Principal of the Salinas Evening School, stated that at least 22 former inmate students of the Soledad school at the California State Prison, Soledad, are now attending various outside schools and colleges.

"We have no way of comparing figures with institutions in other states," Mr. Wilson said, "but we feel the record of these 22, at least, is outstanding and comparative." Mr. Wilson said the school at Soledad was the incentive for a number of the students to continue their schooling on the outside.

The California Legislature has provided an opportunity during the past decade for the consistent development of a sound program of education in the California Correctional Institutions. Supporting the recommendations of the Senate Interim Committee on Adult Education, the 1955 Legislature enacted Penal Code Section 2054 which established legislative acceptance of the program and provided the necessary financial support for a program of academic education on a formula basis. At the same time provision for the financial support for vocational training was made directly in the individual institutional budgets. These developments have given added stability and the assurance of continuity to the entire Correctional Educational Program. Continued maintenance of the level of service established in 1955 enactments was provided by the 1957 legislative revision of Penal Code Section 2054.

Representatives of the State Department of Corrections stated they were fully satisfied with the present financial arrangement of the State allowing flat grants to the department. This has lent an air of flexibility to the program which has proven especially beneficial.

In their appearances before the subcommittee, representatives of the department presented the following specific needs which they felt were necessary to properly enhance the programs now being carried out.

1. A need exists in the educational program of the larger institutions (1,000 population and over) for the establishment of the position of a full-time vocational consultant to service trade advisory committees, to co-ordinate work and training assignments, to provide direct inmate vocational guidance and counseling services, to co-ordinate work and training evaluation and to provide placement followup in conjuction with the Division of Adult Paroles.

2. Provision should be made to improve the vocational training shop facilities at California State Prison, San Quentin, and California State Prison, Folsom.

3. In view of the extensive growth of the educational program, the services of an additional full-time staff assistant to the Supervisor of Education is acutely needed.

4. The physical education and recreation service in the several institutions has been severely handicapped by understaffing. The provision of full post assignment coverage for all recreational areas was recommended.

5. Consideration should be given to equalizing Civil Service Teachers' salaries with the salaries of public school teachers.

6. The library service is in need of a revised position specification for institutional librarians which offers a more realistic approach to the recruitment, upgrading and maintenance of an adequate institutional library staff.

Comments of several representatives of various institutions under the jurisdiction of the Department of Corrections are included below to show different facets of the educational programs at individual institutions.

Benjamin F. Baer, San Quentin Prison, stated that at the present time, all vocational instructors' pay comes from the Department of Corrections' budget. The academic program is operated in conjunction with the Tamalpias High School District on a contract basis. The relationship he found was working out very well. Approximately 50 percent of the men eligible to participate in educational programs were doing so.

E. J. Oberhauser, California Institution for Men, Chino, pointed out that 85 percent of the men who come to the Institution have no trade skill to sell to an employer when they are released. Unless inmates can be given an opportunity to learn a trade and improve their condition while in prison, it was Mr. Oberhauser's opinion that it is merely contributing to the encouragement of further crime and delinquency when prisoners are released. The California Institution for Men has 16 vocational classes and many of the men trained in these classes find positions in that line when released. As an example, he told the subcommittee that up to that time 12 men had completed the office machine

training program and had been released. All 12 are still on similar type jobs in civilian life.

Miss Alma Holzschuh, California Institution for Women, Corona, testified that of the then current 657 inmates at Corona, 400 were enrolled in the school program. The institution contracts with the local school district for the maintenance of the educational program and finds this method most satisfactory because it allows them to have a greater diversity of classes than if they had to depend upon only teachers from their own staff.

DEPARTMENT OF MENTAL HYGIENE

Prior to legislative action in 1953, the Department of Mental Hygiene carried on adult education programs in the state hospitals through the various local school districts that were adjacent to the hospitals.

Approximately one year prior to the legislative action which relieved the department of being able to carry out an educational program on an ADA basis, the department had the following program in adult education. Eight hospitals were involved with approximately 63 different subjects being taught. Some 40 instructors were employed and the department estimated that they served approximately 4000 patients over the yearly period. At that time there were approximately 40,000 patients in the hospitals. Subjects taught were of a very broad range. They dealt primarily with academic subjects, although some vocational work was offered. No adult education program exists in the state hospitals today.

Representatives of the Department of Mental Hygiene declared that they desired the same fiscal arrangement as that given to the Department of Corrections. This would entail allotting a sum of money to contract for services of the type the hospitals feel are desired. This, they feel, would allow them the flexibility of contracting for services from local school districts to present the type of program they feel is needed for a particular group of patients at any given time. It would also mean that all the money needed to run the Department of Mental Hygiene would be in one budget rather than scattered piecemeal in several different budgets.

Representatives of the Department of Mental Hygiene felt the previous system, where money was allotted under the adult education program, held them to certain minimum requirements in terms of number of students and that this did not sufficiently meet the needs of the patients nor of the institution's programs. The fact no adult education programs are currently being provided was greatly regretted.

It was generally agreed among all the witnesses appearing before the subcommittee that education in the hospitals could and should play an extremely valuable role in the rehabilitation of the patient. While there are many factors involved in the rehabilitation and training of mental patients, education plays a very important part in the general treatment.

As one witness stated: "It is difficult to point specifically to education and say that education has made the patient well. It would be equally difficult to point to any one medicine and say that that one medicine has made the patient well. The combination of many factors

helps a patient to resume his place in society. Education is conceded to be a very important part of the combination."

State hospital representatives presented their views and opinions before the subcommittee on the use and value of education in their particular institutions. Only a brief synopsis of their testimony is presented here. It is, however, indicative of the type of testimony consistently expressed before the subcommittee.

Dr. O. L. Gericke, Patton State Hospital, pointed out that since July 1, 1955, patients have lost the privilege of attending any more classes in adult education. This is a right, he felt, which should not be denied. An education program in hospitals for the mentally ill is extremely important if patients are to return to their places in society rather than to be kept in expensive hospitals. Education is a key factor in preparing the patient for his return to life outside the hospital.

Dr. E. F. Galioni, Stockton State Hospital, stated he felt a great need for educational programs within the hospital but that since 1955 the only program at Stockton State Hospital had been to encourage patients, when possible, to attend classes in public or private schools outside the hospital at their own expense. Naturally, this type of program is extremely restrictive in the number of patients who can make use of it.

Dr. John G. McGrath, Napa State Hospital, stated there were no teachers at all for the 5,000 adult patients at Napa. The superintendent of the hospital felt correspondence school training, rather than a formal program within the institution, might serve their purposes best. Although the program should be administered by the institution itself, it would be advisable to hire an educational director to assist and guide patients in the selection of correspondence courses. He felt that money for the educational program should be allotted in the budget of the Department of Mental Hygiene.

Dr. Thomas Nelson, Sonoma State Hospital, pointed out that in a hospital for the mentally retarded, education is an integral part of the treatment program and cannot be separated from it. He suggested each hospital have a professional educator on the administrative level and that an office of co-ordinator or consultant in professional education be established in the Mental Hygiene Department in Sacramento.

Dr. George Tarjan, Pacific State Hospital, explained that since educational programs were an important part of the total therapeutic program in a psychiatric hospital, he felt the educational program should be under the same administrative jurisdiction as the rest of the hospital program. Schools in state hospitals should not only be given an opportunity to keep up with the schools on the outside, but they should become experimental schools too.

Father Richard Waterfall, Catholic Chaplain, Patton State Hospital, told the committee that prior to 1954, Patton had a limited program of education which was totally inadequate: one or two trained people for 4,000 patients. Now Patton has no educational program at all. Since most of the patients will eventually be released, he felt it incumbent that they return to civilian life with added abilities to meet their personal problems and financial obligations which led to their being committed in the first place. In this respect, he said, both academic and vocational education are important.

Dr. Robert E. Wyers, Metropolitan State Hospital, said they have no formal education program now, although he felt it would be extremely valuable both as a means of therapy and as a readjustment to civilian life. A program of vocational education would help build the patient's confidence as well as increase his knowledge. This could be a big factor in helping the patient to leave the hospital earlier than he otherwise would, hence, saving the state money in the long run.

A great deal of discussion during the five days of hearings centered on three major areas of education and its administration within the Department of Mental Hygiene. One of these pertained to the necessity of developing within the department a division of education to co-ordinate and assist educational programs and activities in all the hospitals throughout the State.

A second major topic of discussion related to the need at each hospital for a full-time co-ordinator of education or an educational director. Witnesses representing individual hospitals generally agreed this would be a valuable service. The educational director would be responsible for drawing together all the various kinds of educational experience and offerings and then be able to arrange the best type of education to meet the individual patients' need.

While it was agreed this would be a valuable service and a goal toward which to point, even members of the Department of Mental Hygiene admitted that further study and research of the educational needs and operational and administrative practicalities should be made by the department itself before any such program is established by the Legislature.

The third topic extensively discussed related to the feasibility of correspondence course programs for patients. Although correspondence courses will be discussed at greater length later in this report, it might be said here that most witnesses agreed an educational director immediately available to the patient would be a prerequisite for any correspondence course type of educational program.

CALIFORNIA YOUTH AUTHORITY

California Youth Authority officials emphasized that the school program is a very important part of their entire rehabilitation program. The educational program recognizes that children committed to the Youth Authority are entitled to the fullest educational opportunity, and that it is the responsibility of the Authority to assist these children in overcoming their problems and developing to the maximum their desirable potentials as persons of significance and worth.

The educational program, in co-operation with other Youth Authority disciplines, works toward the development of a therapeutic climate in which satisfactory emotional, social, and educational worth can take place. A primary goal of the Authority is to offer the opportunity of attaining a high school diploma and/or a certificate of eighth grade graduation. Both of these diplomas are issued from the offices of the Department of Education.

The Youth Authority deals with youngsters from the age of about nine years through 18 and 20 years. All of the youths under the age of 16 go back to the public schools. One of the major jobs of the in-

stitutional program is to bridge the gap from the time the youngster is apprehended and removed from the public schools until the time he is returned to them.

The program is based primarily on a 12-month program. However, with the current pressure of the increased numbers of children in detention in juvenile halls, the Youth Authority has had a greater turnover in a shorter length of stay in the institutions than Youth Authority officials would like to see. The average stay for the last year was approximately eight and a half months. There are many instances where boys or girls have increased their abilities from two to three grade levels during their eight-month stay.

The majority of the youths committed to the Youth Authority are generally maladjusted in one or more areas of development. The areas can be broken down as follows:

1. Mental Capacity. Most of these children are at the normal or near normal level of their mental ability. These are the children who would be included in the categories of the mentally retarded, of borderline defectives, and of low average ability.

2. Social Maladjustment. Their interpersonal relations are inadequate and their social values are distorted. They usually display resentment toward authority figures.

3. Emotional Maladjustment. They usually have a distorted self-concept. They manifest many symptoms of anxiety, such as, nervous habits, withdrawal, verbal and/or overt aggression.

4. Educational Maladjustment. Approximately 80 percent of the boys and girls brought into the Youth Authority centers fit in this category. They are usually retarded from about an average of four grade levels, especially in the tool subjects of reading, arithmetic and language. They are lacking in educational motivation and stimulation. They have short attention spans, poor work and study habits. Many of them have bilingual backgrounds. Usually, what learning has taken place is the result of rote memory, instead of an understanding of basic concepts. They can seldom function effectively in group learning situations.

5. Physical. They are afflicted with various types of physical disabilities, especially sight, hearing and speech. They are usually below average in many physical skills and activities.

Taking these factors into account the Youth Authority has developed the following aims and objectives for its educational program:

1. Accept the child at his functional level.
2. Provide those special educational services designed to promote the greatest possible development of the child.
3. Provide educational, vocational, and personal counseling and guidance.
4. Remove academic deficiencies.
5. Prepare the child for re-entry into school.
6. Develop the skills, attitudes and appreciations necessary to the promotion of academic and vocational training.
7. Teach good work habits.
8. Promote worthy use of leisure time.

As an outcome of the need to teach each child at his functional level, the school program, in addition to teaching all subjects required by the California Education Code, attempts to provide experiences at the appropriate level in the following areas:

A. Social studies
   1. Understanding of, and cultivation of loyalty to, democratic ideals.
   2. Understanding and appreciation of American traditions and institutions.
   3. Development of better human relationships.
   4. Acquiring skills in processes of group action.
   5. Realization of importance of contributing to conservation of human and natural resources.
   6. Acquiring attitudes of respect for law and the obligation to fulfill civic responsibilities.
   7. Development of basic skills in the field of social studies: map, graph, chart reading, etc.

B. Mathematics
   1. Understanding the number system.
   2. Using fundamental arithmetic processes with ease and understanding.
   3. Knowledge of consumer mathematics, including the use of money.
   4. Using devices and systems of measurement.

C. Language arts
   1. Reading
      a. To gain information.
      b. As a source of inspiration and enjoyment.
      c. For appreciation of literature.
      d. For understanding of oneself and others.
   2. Writing.
   3. Speech: Communicating effectively with individuals and groups in oral form.
   4. Listening: Developing the art of listening for informational and social ends.
   5. Mastering the techniques for the proper use of the library and other resource materials and facilities.

D. Science
   1. Acquiring a factual knowledge of the physical world.
   2. Knowing the structure and function of the human body and the principles of healthful living.
   3. Cultivating the scientific attitude and provide training in requisite methods and skills.

E. Prevocational and vocational training
   1. Exploring vocational fields through observation and work experience.
   2. Learning manual and vocational skills through shop and vocational training experiences.
   3. Vocational counseling and guidance.

F. Homemaking for girls

1. Culinary arts.
2. Child care.
3. Personal grooming.
4. Home nursing.
5. Nutrition.

G. Special education

1. For mentally retarded.
2. For the emotionally disturbed.
3. In special psychiatric treatment units.
4. For those of low mental ability.
5. Borderline defectives.

H. Nonacademic areas

1. Music.
2. Art.
3. Arts and crafts.
4. Recreation and physical education.
5. Dramatic arts.

Youth Authority representatives had great praise for the Trade Advisory Councils in working with and helping to place youngsters in skilled jobs when they are released. Representatives of both management and labor testified before the subcommittee on the great advantages and effectiveness of the Youth Authority's vocational training programs.

California Youth Authority representatives consider both the academic and vocational school program an integral part of their entire rehabilitation program. They are pleased with the present financial system. However, they believe increases in staff and testing facilities are needed if they are going to be able to continue to do an adequate job.

Under present circumstances, the subcommittee was told, it is almost impossible at the reception centers to give adequate attention to those youths who need more individual diagnosis. Classes are often too large to allow a teacher to work with individual students. This is especially important because a Youth Authority teacher, in addition to teaching, is also trying to change the negative attitudes of his students.

One of the basic problems youngsters coming into the Youth Authority institutions face is that they are unable to read. With this facing them, of course, they are not able to achieve the rest of the educational program. At the present time the Youth Authority, according to Mr. Harry Wilson, Supervisor of Education for the Youth Authority, is unable to provide people who have special training in the teaching of remedial reading. He felt that some specialists in this kind of work would be invaluable to their program. Such a teacher who would be able to not only work with retarded youngsters, but also a person who would be able to work with other teachers on the staff in terms of in-service training and developing of a good reading program throughout the educational program of the department would be a great assist.

Mr. Wilson noted that part of the wording of the Welfare and Institutions Code 1121 is no longer applicable because of a change of job description. He recommended that this section be repealed.

Mr. Wilson also pointed out that youngsters, when they are released, are not permitted to take home with them many of the items they have made during their vocational training classes. State law does not presently allow these items to be removed because they are made from material originally purchased with state funds. It was strongly recommended that this part of the law be changed to allow youngsters to take these items home with them.

CITY AND COUNTY PENAL INSTITUTIONS

Jails in California are operated by both counties and municipalities. County jails number 58; city jails, approximately 220. In many of the larger counties and cities, the central jail is supplemented by substations or "lockups"—local detention facilities for the brief holding of persons arrested in outlying areas. Approximately 21 county jails and several city jails maintain camps or farms as adjuncts to the central jail, thus increasing their capacity and also providing meaningful employment for many inmates after sentence has been pronounced by the courts.

The county jail systems are operated by the county sheriffs, although in six counties the jail camps or farms are under the jurisdiction of the board of supervisors, and in one case the county road commission. The city jails are generally operated by the city police departments, except in a few cases where the city and county jail is combined. In these cases the consolidated facility is operated as a single county unit by the sheriff.

The city jails of the State receive more offenders than the county jails during the course of a year. However, because of the shorter stays of their inmates, the city jails have a much smaller resident population at any given time.

Jail populations are heterogeneous groups containing many persons who may properly belong elsewhere. Alcoholic inmates, some probationers who are serving sentences as a condition of probation, juveniles, petty offenders, and various "hold on suspicion" cases are examples.

Approximately 85 percent of the resident population in California penal institutions have had prior experience either in a juvenile reformatory, county jail or a state prison. Of this 85 percent, somewhere between 40 percent and 45 percent have spent time in reformatories or in county and/or city jails.

Education activities in city and county jail systems are at present in a serious state of decline, if, in fact, they exist at all. Prior to the termination of state support for adult education programs in 1953, several jails had maintained active classes for inmates, particularly at the camps and farms where long-term misdemeanants were quartered. The cessation of state support caused the entire program to collapse abruptly.

Since the termination of the educational program, jail administrators have had a chance to observe the results of its termination. There appears to be a consensus that the consequences are generally unfavorable. A strong sentiment has arisen in favor of the restoration

of educational aid. Illustrative statements of this sentiment as well as specific comments and opinions are shown below.

Members of the Department of Corrections favor a restoration of education classes to the county and city jail programs and feel that part-time teachers from local schools can be used in areas that do not require full-time staffs. Some type of education and counseling-guidance service would be invaluable in making inmates aware of facilities available to help them in the community when they are released. Proper counseling might be able to prevent a person from coming back into the penal system, thus, in the long run, saving the state money.

Department of Corrections representatives held that some type of work could and should be done with short-term inmates because such work with a person during his first experience in jail is usually the most effective and ultimately the most beneficial. This work could include any one or all of the following: academic education, vocational training, psychiatric care, guidance-counseling.

The Special Study Commission on Correctional Facilities and Services, in a report issued in March, 1957, had the following to say regarding the current educational programs in county jails:

"Inmate activities were set back severely (especially in the larger counties) in 1953 by the termination of state aid to jail educational programs. In the present survey [1956] card playing was the most commonly reported type of inmate recreation . . . Educational programs including both academic and vocational training should be re-established in county jail systems where inmate numbers and length of sentence make such activities appropriate. These programs should be based upon state funds, and should be conducted in co-operation with the local school systems. Standards for the organization and conduct of such training should be carefully worked out. * * *

"Inmate activities should be carefully programmed: work and training programs should be integrated; academic classes should be based on real needs of inmate groups; outside speakers should be carefully selected as to topic and relevance to inmate needs and interests; educational, recreational, and athletic phases of the program should be maintained in a reasonable balance. * * * Legislation should be enacted to provide for the re-establishment of academic and vocational training programs in county or regional jail facilities whose populations are sufficiently large to justify them."

COUNTY

Prior to 1954, the Sheriff's Department of the County of Los Angeles maintained an educational program at the Wayside Honor Rancho under the basis of ADA. The change in legislation caused the stoppage of the educational program until several years ago when the county board of supervisors reinstated it on a $50,000 a year lump-sum agreement between the county and the Newhall School District.

Sheriff's officials stated that from the approximately 1200 eligible inmates, about 225 were then taking classes, which was the maximum number that could be handled under the $50,000 budget. They estimated they were filling only about half of the present need. No vocational program is offered at all.

Other Los Angeles County penal institutions include the Mira Loma Institution, Sybil Brand Women's Facility, the county jail and various road camps. None of these institutions offer educational programs because no funds for such activities exist. County officials feel educational programs in these institutions would have the same marked effect upon the inmates as it has upon those at the Wayside Rancho.

Mr. W. W. Anderson, principal of the Amador Valley Joint Union High School, testified that for aproximately eight years prior to 1953-54 his high school had conducted an educational program in the Santa Rita Rehabilitation Center at the request of the sheriff's office. Although he felt the program had worked admirably for a comparatively small sum, it was discontinued after 1953-54 because the school district could not carry the burden of additional costs under the new legislation. Mr. Anderson felt the program should be reinstituted and conducted by the local school district rather than through the department of education or the correctional agency and that the money should come completely and directly from the State. "This would take care of education for inmates who come from all over and relieve a small school district of the burden." This, he felt, would be the most equitable way of handling the financial costs involved. It is a state-wide problem, not just a local district's problem. It should, therefore, be financed by the State as a whole.

CITY

Prior to 1955, a welfare and rehabilitation program operated within the city jails of Los Angeles under the program of financial aid from the State. The city board of education operated the institutions within the City of Los Angeles and the Newhall School District operated the city's rehabilitation center at Castaic.

Following the legislative change in 1954, the police department negotiated with the city board of education to run a very limited program in the city jail. The trade school program at Castaic was taken over by the police department, utilizing officer personnel as teachers, because the department did not have adequate funds to maintain the contract with the Newhall School District on a full-cost teaching basis. Both arrangements are highly unsatisfactory, according to city police officials.

It should be pointed out that Los Angeles is one of the very few city jails in the State of California which manages to maintain any type of educational program at all.

Although about half of the inmates serve short-term sentences (ranging from 30 days to six months), police officials argue that an educational program, particularly along vocational and psychological reorientation lines, would be very beneficial. The Los Angeles Police Department feels strongly that city jails should be included if state financial assistance is to be returned to educational jail programs throughout the State.

A representative of the Los Angeles Police Department said, "We feel that people in custody are citizens, for the most part—certainly they are in need of training. And probably it is as important for someone to prepare these people in subjects which may aid in their rehabilitation and assist them in making a suitable adjustment upon release, as it is to teach folk dancing and some of the other questionable sub-

jects which are taught under the adult education program and which do receive state aid * * * ''

Representatives of the Northern and Southern California Service Leagues, the Jewish Committee on Personal Service and the American Friends Service Committee all testified on the great value of education in the jails and prisons and of the need to reinstate programs where they have now been excluded. They urged increasing the educational program wherever possible. They felt strongly that educational programs in city and county jails were very useful, even if the sentence of the prisoner was only for a short period of time.

Judge Peters, League of Northern California Services, expressed this strong point of view to the subcommittee: ''County jails, which have the greatest chance of rehabilitating prisoners, are breeding places of crime. Every person has a stake from the standpoint of preserving human values by restoring these people to society as useful members. Classes are definitely a beneficial part of the rehabilitative process.''

OTHER

Four other areas which received a great deal of discussion throughout the hearings should be mentioned here. These include teachers, libraries, correspondence courses, and guidance schools.

TEACHERS

A general problem, which was voiced by almost every witness from the Department of Corrections, the Department of Mental Hygiene, the California Youth Authority and representatives of individual institutions, related to teachers and their recruitment.

It was commonly regarded that teachers in schools operated at state institutions are placed at a competitive disadvantage with their fellow teachers in public school systems by the requirements that they work under civil service rules. Recruitment of more and well qualified teachers is thus becoming increasingly difficult.

The difference between a school district's 10-month year and the civil service 12-month year deprives teachers of the opportunity to use their summers to acquire additional training necessary for professional advancement. The consensus was that the teachers in state institutions should receive salaries and retirement benefits comparable to those offered teachers in the public school system. Some teachers, it was pointed out, were donating their spare time at various institutions, particularly in the trades. Many hospitals and penal institutions are forced into recruiting inmates as teachers.

Mr. Harry Wilson, Supervisor of Education for the Youth Authority, summed up the general feeling when he recommended getting above-average teachers who could counsel and deal with children's and adult's emotional problems as well as teach. They should be paid above-average salaries.

LIBRARIES

Several witnesses pointed out in their testimony that California often is neglectful of the libraries in its various institutions. Many inequalities exist at the present time.

For example, Chino Institution for Men has a small, but adequate, library and a full-time librarian. The Corona Institution for Women,

however, has only a $100 expenditure in its budget for a library and relies mostly on volunteer agencies to supply books and magazines. They have no librarian.

Many witnesses commented on the great difficulty of recruiting trained librarians. They pointed out that problems usually arose over the same factors that made recruitment of teachers so difficult.

It was generally felt by the subcommittee that these were problems which could best be solved by each individual institution through the official channels of communications with their respective departments and hence to the Legislature, rather than the Legislature taking any broad, all-encompassing action.

CORRESPONDENCE COURSES

Many individuals stated they were anxious to have arrangements made for patients and/or inmates to be allowed to take correspondence courses. Many people saw advantages in the use of correspondence courses in both an educative and rehabilitative manner; others questioned the practicality of such courses for rehabilitative purposes. It was generally agreed that such courses would require a trained individual to counsel, administer and assist in any such correspondence course program.

Mr. A. Lamont Smith, reported that the Department of Corrections made wise use of correspondence courses in several of their institutions and that the results had been very rewarding. He pointed out that the inmates were carefully screened by an educational director before they were permitted to sign up for such courses. He stated that they allow no duplication with classes offered in their own institutions and that the department has working relationships with the University of California, the University of Pennsylvania and the University of Denver.

Dr. Ernest Englebert, from the University of California, pointed out that the extension service of the university is 85 percent self-supporting and therefore it is difficult for the service to grant any special financial arrangements. However, he stated that he and his staff were willing to work with any institution or department in making other special arrangements for correspondence course programs.

Again, the subcommittee felt this was a program which could best be worked out by the individual agencies concerned.

GUIDANCE SCHOOLS

Mr. A. B. Campbell, Assistant Superintendent of Schools in Berkeley, appeared before the subcommittee at its last hearing on December 17th to present a proposed plan to develop guidance schools. The subcommittee also received a detailed legislative proposal for such schools from Mr. O. H. Olson, representing the Co-ordinating Committee on Youth Guidance of San Mateo County.

These men pointed out that a number of educators, social workers, juvenile court officers and probation officers were interested in establishing such schools. Particular interest has been shown in Santa Clara, San Mateo and Alameda counties.

Mr. Campbell stated that there is a small percentage of youths who object to parental discipline and who fail to develop under the regular school program. Many children do not have the proper home influence

to correct the youth's delinquent tendencies and behavior. Still other children become delinquents because they are unduly influenced by their older brother or sister, who has become a juvenile delinquent.

Mr. Campbell felt these youths could be prevented from getting into serious trouble if they were given the proper assistance in time. He advocated a residence school where youths who showed pre-delinquent behavior could be placed for a short period of time on a 24-hour-a-day basis. Mr. Olson stressed that this type of school program would have to be a financial undertaking of the local county or district.

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REPORT OF THE

SUBCOMMITTEE ON EXTENSION AND RESTRICTION OF TENURE

OF THE

ASSEMBLY INTERIM COMMITTEE ON EDUCATION

MEMBERS OF THE SUBCOMMITTEE

ERNEST R. GEDDES, *Chairman*

CARLOS BEE
JOHN L. E. COLLIER
CARLEY V. PORTER
HAROLD T. SEDGWICK
EDWARD E. ELLIOTT

JAMES C. MARSHALL, *Consultant*
BLANCHE V. HANSEN, *Secretary*

March, 1959

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OF THE STATE OF CALIFORNIA

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LETTER OF TRANSMITTAL

ASSEMBLY, CALIFORNIA LEGISLATURE
SACRAMENTO, March 10, 1959

HON. RALPH M. BROWN
Speaker of the Assembly, and
Members of the Assembly
Assembly Chamber, Sacramento

GENTLEMEN: Pursuant to House Resolution No. 285, adopted June 8, 1957, the Assembly Interim Committee on Education herewith submits its final report on Extension and Restriction of Tenure.

Respectfully submitted,

DOROTHY M. DONAHOE, Chairman
Committee on Education

SUBCOMMITTEE LETTER OF TRANSMITTAL

ASSEMBLY, CALIFORNIA LEGISLATURE
SACRAMENTO, March 10, 1959

HON. DOROTHY M. DONAHOE, *Chairman*
Assembly Committee on Education
Assembly Chamber, Sacramento

DEAR MISS DONAHOE: Pursuant to the general authority of House Resolution No. 285, adopted June 8, 1957, under which this subcommittee was appointed, the Subcommittee on the Extension and Restriction of Tenure held hearings in San Diego on October 15, 1958, and in Los Angeles on December 6, 1958. This report is the result of those hearings and an independent research study conducted by the committee staff.

Respectfully submitted,

ERNEST R. GEDDES
Chairman of the subcommittee

CARLOS BEE
JOHN L. E. COLLIER
EDWARD E. ELLIOTT
CARLEY V. PORTER
HAROLD T. SEDGWICK

SCOPE OF THE REPORT

This report consists primarily of a summary of the teacher tenure laws throughout the 49 states and for this reason it has been entitled "Teacher Tenure Laws in the Forty-nine States." It was prepared by the staff of the Assembly Interim Committee on Education at the direction of Assemblyman Donald D. Doyle, Chairman of the Committee, and Assemblyman Ernest R. Geddes, Chairman of the Subcommittee on Extension and Restriction of Tenure.

Such a study has been needed for many years, since research by the staff developed the fact that there has been no comprehensive study of teacher tenure laws except those made by groups with a special point of view. The most recent study of this nature was completed by the Research Division of the National Education Association in November of 1958.

This report has been prepared as a guide to legislators and other interested parties who have occasion to refer to what other states are doing in the way of providing protection and tenure to their school teachers. In order to make the report completely factual, no comparisons have been drawn between states, as it is felt that an unbiased research report is not the place for such conclusions.

It should be pointed out here that all of the members of the Subcommittee on Teacher Tenure appointed following the 1955 General Session were also Members of the Assembly in the 1957 Legislature and all are currently Members of the Assembly in this, the 1959 Legislature. Moreover, with the exception of Assemblyman Donald D. Doyle, who did not seek re-election, four of the members of the 1955 subcommittee were also members of the present subcommittee. They are: Assemblymen Carlos Bee, Edward E. Elliott, Ernest R. Geddes, and Carley V. Porter.

In April of 1956, the former subcommittee studying the matters relating to tenure presented a Research Report on Teacher Tenure and Employment Practices in California School Districts.

In hearings conducted by the preceeding subcommittee, the California Teachers Association presented and made available to the members its Bulletin No. 90, May, 1956, entitled Tenure Attitudes of Teachers in Small Districts.

The two foregoing documents were available to the present subcommittee and by this means again put in the record. They did not, however, influence legislation in the 1957 Session of the Legislature.

FINDINGS

1. The maintenance of a sound teacher tenure system is advantageous to the best interests of the public school system.
2. The present teacher tenure provisions have operated to the benefit of education within this State. The advantages of such a system have far outweighed the disadvantages.
3. An effective tenure system must be based on careful selection and evaluation of teachers, particularly during the probationary period.
4. Tenure can operate successfully only when there is an administrator in a position to judge the capabilities of the teacher.
5. Since the present law prescribes that a district having eight or more teachers must employ a principal, tenure provisions could be extended to such districts with the assurance that proper evaluation and selection could be administered.
6. The present requirement of 850 a.d.a. for teacher tenure coverage is an arbitrary figure which has little relation to actual school operations.
7. Present requirements and procedures regarding the dismissal of probationary teachers in districts of 85,000 a.d.a. has generally operated satisfactorily.

RECOMMENDATIONS

1. Teacher tenure provisions should be extended to include teachers in districts of 250 a.d.a. and above.
2. Present requirements and procedures regarding the dismissal of probationary teachers in districts of 85,000 a.d.a. and above should remain in effect.

FULL REPORT

TENURE IN CALIFORNIA

The movement for teacher tenure in California dates back more than 90 years and was inaugurated and led by John Swett, State Superintendent of Public Instruction between 1862 and 1867.

The then widespread practice of hiring and firing teachers on a political patronage basis rather than on a basis of merit finally resulted in action by the California Legislature in 1911 when the first simple provisions providing tenure protection were written into law. These provisions provided that if by the tenth of June a teacher had not been notified that his services would not be required the ensuing school year, he was automatically re-elected.

In 1921 provision was made for a two-year period of probation in all districts with eight or more teachers and an administrator. Dismissal was to be only for good and sufficient reason and written notice was required.

Six years later, in 1927, tenure was extended to all districts regardless of size, after teachers had served a probationary period of two years. Trustees and administrators, particularly in smaller districts, attacked the new law on the grounds that it prevented the removal of unsatisfactory teachers since the district, being small, afforded no other position to which the teacher might be transferred. It was at this time that the California Teachers Association petitioned the State Supreme Court which upheld the constitutionality of the act.

The act was modified in 1931 and the legislation enacted limited the districts required to grant tenure to those with 850 units of average daily attendance or more. It also increased the probationary period required to be served to three years. Also enacted were the provisions which still exist in the law: requiring a written statement of reasons for dismissal, hearing before a superior court of charges against a teacher, and appeal and review. It has been stated that the California Teachers Association which sponsored the 1931 legislation proposed a line of demarcation beginning at 300 units of average daily attendance but the 850 figure was arrived at as a compromise. This answers the oft-repeated question as to why 850 rather than 500 or 1,000 or some other figure appears in the law.

By the year of 1935 the school population of the City of Los Angeles had grown to over 60,000 in average daily attendance with the result that among so many teachers few of them were personally known to members of the school board. This resulted in personnel problems and charges of unfair practices in the dismissal of probationary teachers.

In that year the Legislature enacted into law the provision that in school districts of 60,000 average daily attendance or over probationary teachers might be dismissed for cause only and that the determination of the board as to the sufficiency of the cause for dismissal shall be conclusive, but the cause shall relate solely to the welfare of the schools

and the pupils thereof. Amended in subsequent years, the law now provides that the size of the school district shall be 85,000 or more pupils in average daily attendance and provides for notice to the probationary teacher and entitles him to a hearing on his request.

SUBCOMMITTEE HEARING IN SAN DIEGO

On October 15, 1958, the subcommittee held a hearing in San Diego for the purposes of gaining testimony regarding the extension or restriction of teacher tenure in California. Representatives from the California School Boards Association, local school boards and districts, the California Teachers Association, the California State Federation of Teachers, and teachers from local teacher organizations appeared at the hearing to present their views and opinions on tenure.

While it would be impossible to summarize all of the valuable testimony given at the hearing, the following summarizations are made in order to highlight some of the most important points which the subcommittee heard.

Mr. Hillas Cole, President of the California School Boards Association:

The position of the California School Boards Association is as follows:

1. We do not oppose the principle of tenure in districts over 850 a.d.a.
2. We find the present legal provisions for the dismissal of unfit permanent teachers are unjustifiable and unworkable. They are detrimental to the best interests of the boys and girls of California.
3. We are opposed to the extension of tenure to districts of less than 850 a.d.a.
4. We believe there should be a real probationary period of not less than three years, in order that a teacher may be properly evaluated before being granted tenure.

The association is opposed to legislation which would extend mandatory tenure to districts with less than 850 a.d.a. It would be more difficult to administer mandatory tenure in a small district. The primary problem would be that a poor teacher on tenure could not be shifted from one assignment to another as readily as in larger districts.

The association opposes legislation which weakens the authority of a school board and its staff to evaluate and, if necessary, dismiss a teacher during the probationary period of three years. We feel the probationary period has considerable value to pupils of the district, to the district itself, and to the teacher. To require a school board to give written notice of the reasons for dismissal to a probationary teacher will mean no true probationary period will exist.

A written notice for dismissal will imply that the teacher is entitled to hearings, appeals, etc. The resulting expenses and complications of such dismissal procedures would be so prohibitive to a board that a real probationary period would be negated. While it is good policy for a district to give the reasons for dismissal to a teacher, it is very poor legislation.

Mr. Robert E. McKay, Governmental Relations Executive of the California Teachers Association:

Maintenance of a sound system of teacher tenure is essential to the public schools. Its purposes are twofold.

First, tenure protects competent teachers against unjustified dismissal. Secondly, and more importantly, tenure protects children from being taught by poorly trained and dissatisfied teachers. A sound tenure law improves the educational opportunities of children by making necessary increased care by administrators in the selection, retention and supervision of teachers.

The California Teachers Association favors the extension of tenure to districts of 250 a.d.a. and above. To be effective, tenure must be based on careful selection and evaluation of teachers, particularly during the probationary period. Consequently, tenure can operate successfully only when there is an administrator in a position to judge the capabilities of the teachers. Since under the law a principal must be employed by a district having eight or more teachers, it seems logical to use the same basis for determining the point where tenure should begin instead of the arbitrary 850 a.d.a. figure, which has no relationship to actual school operations.

As to the proposal for a statement of reasons for dismissal of probationary teachers, experience has shown that some probationers, most of them new to the profession, are released without every knowing officially why. If they could be given a written statement upon request, they would be in a position to correct any real deficiencies which might exist and go on to become a competent teacher. On the other hand, if no valid reasons existed in the first place, the requirement could well prevent capricious dismissals.

Mrs. Margaret Collins, President of the San Diego Teachers Association:

We believe the principle of teacher tenure as we know it in California is valuable for several reasons.

1. We feel that a good, workable tenure system encourages professionally qualified men and women to enter the profession and to remain in the profession.

2. We believe tenure encourages good classroom techniques and teaching procedures.

3. We believe the right to tenure is accompanied by a corresponding obligation on the part of all teachers to render professional service of a high order.

Mr. Frank Tait, Director of Personnel, San Diego City Schools:

The San Diego city schools operated for a while under Education Code Section 13583 when that section stated that probationary teachers in districts of 60,000 a.d.a. could only be dismissed for stated causes and that the teacher was entitled to a hearing. This figure was later changed to 85,000 a.d.a. The San Diego city schools have now reached the 85,000 a.d.a. level and are again coming under the provisions of Education Code Section 13583.

We have been through the hearing proceedings with a hearing official. We are of the opinion that we can live with this provision of the code

because we have geared ourselves to meet the situation and feel it can, should, and will represent good personnel practices with our probationary teachers.

Mr. G. Keith Dolan, Representative of the La Mesa-Spring Valley School District and the La Mesa-Spring Valley Teachers Association:

The 350 teachers of the La Mesa-Spring Valley School District unanimously support the proposition that teacher tenure is a basic need of every qualified teacher and leads to better results for the profession, the community, and the students with which they work. The factors favoring strong tenure protection for teachers are generally as valid for these small districts as for larger school districts.

I think, as administrators, that if we are concerned about a teacher's ability within the classroom, we should put those feelings in writing for the protection of that teacher, so he may actually know what is wrong with his teaching.

Mr. Donald Henry, Representative for the California State Federation of Teachers:

The California State Federation of Teachers has taken the following position regarding teacher tenure:

1. The extension of tenure should be granted to all districts of the probationary protection in the form now granted under Education Code Section 13583, which makes it mandatory to state causes of dismissal to teachers in districts of 85,000 a.d.a. and over.
2. Tenure should be extended to teachers in *all* districts.
3. Any substitute or opposing suggestions should be rejected.

With this short history of teacher tenure in California and the hearing of the subcommittee in San Diego, the reader is referred to the following independent study of teacher tenure laws in the United States. The study includes a brief summary of the various provisions of the states' laws; a state-by-state tabulation of the laws of each state; and a chart showing the salient factors in each state.

TEACHER TENURE LAWS IN THE FORTY-NINE STATES

The first Teacher Tenure Law was enacted in the State of Massachusetts in 1889. Since that time the majority of the states have adopted laws which give teachers within their borders protection against arbitrary dismissal. These laws vary in the amount of protection offered and in the processes providing such protection.

As of 1959, 12 states have no statutory state-wide tenure laws at all. These states include Georgia, Maine, Maryland, Mississippi, North Carolina, North Dakota, South Carolina, Texas, Utah, Vermont, Virginia and Wyoming. These states generally tend to have either small populations or are states in the deep south. Although particular cities and counties within these states may have adopted tenure laws for their teachers, there are no state-wide tenure laws. This is the case, for example, in DeKalb County in Georgia and in the City of Baltimore in Maryland.

Eight states have what is known as a Continuing Contract Law. This means that a teacher who is not notified prior to a designated date in the spring may consider that his contract has been automatically renewed

for another year. In some of these states a teacher may demand a hearing before the local school board if his contract is not renewed. These states include Alaska, Arkansas, Idaho, Iowa, Nevada, Oklahoma, South Dakota and Washington.

While this type of arrangemnt affords only partial protection to a teacher and lacks the permanent features of tenure, it is an advanced step over no tenure at all.

In the remaining 29 states various types of permanent tenure laws have been enacted by the respective state legislatures. While there are variations and degrees in the protection offered, the general pattern of a permanent tenure system is as follows:

A teacher serves a probationary period during which time the contract is subject to annual renewal. At the conclusion of the probationary period, the teacher attains a permanent tenure status. After the attainment of such status, the removal of the teacher can only be made for cause. Generally, the causes for removal are set forth in the law. The teacher must be notified in writing well in advance of the end of the school year and such notification must state the reasons for dismissal. The teacher has a right to have a hearing before the local school board, which includes the right to have counsel, call witnesses, cross-examine witnesses, introduce testimony, etc.

In most cases if the local school board's decision is adverse to the teacher, he is given the right to appeal the decision to a higher authority. His appeal may be taken either to a higher educational authority within the state or to the courts or to both.

A numerical breakdown of the provisions used by most states is as follows:

Probation. This ranges from two years in Illinois, Michigan and Pennsylvania to five years in Indiana. The average probationary period is three years. This is used in 23 states. New York and California vary the probationary period within the state. For example, in California the teachers in districts between 850 average daily attendance and 85,000 average daily attendance are eligible for tenure at the end of three years. Teachers in districts of 85,000 average daily attendance and above are eligible for tenure at the end of two years.

Causes for Termination. Twenty-four states provide specific causes for termination of a teacher's tenure status. The causes appearing most frequently include incompetency, insubordination, conduct unbecoming a teacher, neglect of duty, immorality, inefficiency and failure to obey the laws of the state and nation.

Tennessee is the only state whose tenure law clearly defines incompetency, neglect of duty, conduct unbecoming a teacher and insubordination. Pennsylvania, in determining whether a teacher should be dismissed for incompetency has developed a rating system, prepared by the Department of Public Instruction and administered by the Superintendent of Schools.

Five states list no specific cause for dismissal, but instead provide that a teacher may be removed for "good and just" cause.

Hearing. With the exception of Colorado and California all of the 24 states require that a teacher having tenure status be given a hearing by the local school board. Colorado law requires that a special panel

be selected which, following a hearing, recommends action to the local school board. In California, if a teacher having tenure contests the intention to dismiss him, the local school board must go to superior court where the hearing is conducted as a regular trial before the court.

Appeal Provisions. Appeal provisions from the local school board's decision varies widely among the states. The decision of the local governing body is final in Indiana, Kansas, Missouri, Nebraska and Wisconsin. Although no appeal provisions are specifically stated in the laws of Connecticut, Massachusetts, Minnesota and New Jersey it is assumed that appeal to the courts is open to the teacher unless specifically denied by other statutes of the particular state.

Eleven states allow for appeal to higher educational agencies rather than providing for court trials. Four states allow appeal to the courts from the educational agencies decision. In seven states, the decision of the higher educational agency is final. Eight states provide for the right to appeal directly to the courts from the local school board's decision.

A chart will be found at the conclusion of the state-by-state tabulation which summarizes some of the salient factors developed at greater length in the survey.

ALABAMA

Requirements for Tenure

Continuing service status is attained by having served under contract for three (3) consecutive years in the same school system.

Causes for Termination

Incompetency, insubordination, neglect of duty, immorality, justifiable decrease in the number of teaching positions, or other good and just cause. Cancellation may not be made for political or personal reasons.

Procedure for Removal

The teacher must be notified in advance of such cancellation by a written notice stating the reasons for termination. The teacher is entitled to a hearing before the board of education, where he may present a statement, have counsel, call witnesses, etc.

Appeal Provisions

The teacher may appeal to the State Tenure Commission. A majority vote of the commission members is required for a decision.

The commission's decision may be reviewed by the circuit court of the county where the school is located to see if the decision complies with statutory provisions or is unjust.

ALASKA

Teachers work under the provisions of a statewide continuing contract law.

Notice of nonrenewal of contract must be given the teacher prior to March 15th. Causes for nonrenewal must be clearly stated in the notice and they may include incompetency, immorality, substantial noncompliance with school laws and regulations, or a decrease in enrollment.

The teacher has a right to have a hearing before the local board. The teacher may appear with counsel, demand the appearance of adverse witnesses, present evidence, etc. The proceedings of the hearing are recorded and copies are sent to the teacher, the school district and the commissioner of education.

ARIZONA

Requirements for Tenure

A certificated teacher, employed under contract in a school district as a full-time classroom teacher, attains tenure when his contract is renewed for a fourth (4th) consecutive year of such employment in the same district.

Causes for Termination

Good and just cause. This shall not, however, include religious or political beliefs or affiliations unless in violation of the oath of the teacher to the laws of the U. S. and Arizona.

Procedure for Removal

No continuing teacher's contract may be terminated unless written notice specifying the cause for dismissal is given the teacher by the school board. The teacher has the right to request a hearing before the board and at that time he may appear, have counsel, present testimony, evidence, etc. Within 10 days the board shall determine whether there existed good and just cause for the dismissal.

Appeal Provisions

The teacher may appeal the board's decision to the superior court of the county in which he was employed.

ARKANSAS

No statewide permanent tenure laws exist. A teacher contracts annually under the provisions of a continuing contract law.

Every contract of employment made between a teacher and a board of school directors shall be renewed in writing on the same terms for the school year next succeeding the date of termination fixed therein; unless within 10 days after the date of the termination of said school term, the teacher shall be notified by the school board that such contract will not be renewed for such succeeding year.

CALIFORNIA

Requirements for Tenure

Tenure requirements are separated into three categories on the basis of average daily attendance per school district. They are:

(1) **Districts with less than 850 a.d.a.** These teachers contract annually. At the end of three (3) years of teaching in the school district they may be granted tenure, but at the local school board's pleasure.

(2) **Districts with more than 850 a.d.a.** Those teachers who are rehired for a fourth (4th) year after serving three (3) consecutive years, automatically attain tenure.

(3) **Districts with more than 85,000 a.d.a.** At the discretion of the governing board, a teacher having been employed by the district for

two (2) consecutive years may, at the commencement of the third year, be classified as a permanent employee.

Causes for Termination

Immoral and unprofessional conduct; dishonesty; incompetency; commission, aiding or advocating the commission of acts of criminal syndicalism; evident unfitness for service; physical or mental condition unfitting him to instruct or associate with children; conviction of a felony or of any crime involving moral turpitude; persistent violation of or refusal to obey school laws of the State or reasonable regulations prescribed for the government of the public schools by the State Board of Education or by the governing board of the school district employing him; failure to answer questions regarding Communist Party membership, advocacy of violent overthrow of the government or knowing communist membership; teaching or advocating communism with the intent to indoctrinate any pupil with, or inculcate a preference in the mind of any pupil for communism.

Procedure for Removal

The teacher must receive written notice from the board that his services are to be terminated. He has 30 days within which to demand a hearing. The responsibility is upon the local school board to initiate such proceedings if the teacher contests the termination. Such hearing is by the superior court of the county in which the district is located, and the court decides whether the charges are true and constitute sufficient cause for dismissal. In matters of fitness, competency and professional conduct the court is authorized to admit as evidence the findings and reports of the Personnel Standards Commission of the California Teachers Association based on studies of facts involved in a given dismissal case. Members of the commission and its hearing panels may testify as to their professional judgment on the fitness, competency or conduct of the accused teacher, but only after qualification as to their status as "expert witnesses." This provision of the California law is unique in American teacher dismissal procedures in providing for an officially recognized judgment of such matters by disinterested members of the teaching profession. The court hearing is a regular trial in court. If the court so decides, but not otherwise, the board may dismiss, but is not required to do so.

Appeal Provisions

Either party may appeal the superior court's decision to the district court of appeal or the Supreme Court.

COLORADO

Requirements for Tenure

Coverage is mandatory in first-class districts and in county or union high school districts; elsewhere coverage may be adopted by vote of two-thirds of the local board.

Any certificated teacher having served as a teacher in the same school district on a regular full-time basis for three (3) years and is then hired for the fourth (4th) year shall have stable and continuous tenure as a teacher in such school.

Causes for Termination

Incompetency, neglect of duty, immorality, insubordination, justifiable decrease in the number of teaching positions, or other good and just cause.

Procedure for Removal

Written notice setting forth the basis upon which action is requested shall be filed with the secretary of the employing board by the person initiating such action. The board will study these charges and will decide on this basis whether to dismiss. Written notice must be given the teacher of intention to dismiss. The teacher may request a hearing before a panel selected as follows: Teacher selects one member, school board selects one member (not a member of the board), and the two select a third member. This panel holds a full hearing and then decides by majority vote. The panel recommends action to the board.

Appeal Provisions

If the panel's recommendation is accepted, such conclusion shall not be set aside except for fraud, abuse of discretion, or violation of law.

If the board does not accept the panel's recommendation, the teacher may appeal the decision to the State Commissioner of Education.

CONNECTICUT

Requirements for Tenure

A teacher's contract may be terminated at any time for any of the reasons listed below, but otherwise it will be renewed for a second, third or fourth year unless the teacher has been notified in writing prior to March 1st.

Beginning with and subsequent to the fourth (4th) year of continuous employment of a teacher by a board of education, the contract shall be renewed from year to year, except that it may be terminated for any of the causes listed below.

Causes for Termination

Inefficiency, incompetency, insubordination against reasonable rules of the board of education, moral misconduct, disability shown by competent medical evidence, elimination of the position to which the teacher was appointed if no other position exists to which he may be appointed if qualified, and other due and sufficient cause.

Procedure for Removal

The board must give the teacher a written notice of intention to dismiss, setting forth the appropriate reasons. The teacher may demand a hearing before the board and may be represented by counsel. The board has 15 days after the hearing to notify the teacher of its decision.

The teacher, who has not attained permanent tenure by completing three years of teaching, may also demand a hearing before the board if he is going to be dismissed for any reason.

Appeal Provisions

No appeal provisions stated.

DELAWARE

Requirements for Tenure

The teacher attains tenure by having completed three (3) years of service in the state, two years of which shall be in the employ of the terminating board.

Causes for Termination

Immorality, misconduct in office, incompetency, disloyalty, neglect of duty, willful and persistent insubordination, a reduction in the number of teachers required as a result of decreased enrollment or a decrease in educational services.

Procedure for Removal

The school board must give written notice, by registered mail, to the teacher before May 1st. The teacher may request a hearing before the board. The hearing must be confined to the reasons stated in the written notice. All legal rights will be employed at the hearing, to include counsel, witnesses, and cross-examination. The board has 15 days in which to reach a decision.

Appeal Provisions

Within 10 days of the board's decision, the teacher may appeal to the superior court of the county in which he was employed. The court may approve the board's action, reverse it, or remand the cause to the board for a rehearing.

FLORIDA

Requirements for Tenure

Teachers who hold a regular certificate based on at least graduation from a standard four-year college, who have completed three (3) years of service in a county and who have been reappointed for a fourth (4th) successive year shall be issued a continuing contract.

Causes for Termination

Good and sufficient reason. (Should the board have to choose from among its personnel who are on continuing contracts as to which should be retained in the event of reduction in staff or consolidation of programs, the following criteria is to be used: Educational qualifications, efficiency, compatibility, character, and capacity to meet the needs of the community).

Procedure for Removal

The teacher may be dismissed or returned to annual contract by the county board when a recommendation to that effect is submitted in writing to the board by the county superintendent, or by a majority of the county board, at least three months before the close of the school year.

A public hearing is held if the teacher so requests.

Appeal Provisions

The teacher may appeal for a review to the State Board of Education through the State Superintendent of Schools. The state board's decision shall be final as to sufficiency or insufficiency of the reasons for dismissal or discontinuation of the continuing contract status.

GEORGIA

No permanent tenure laws exist. Teachers hold a teaching certificate contract with the local school agencies for prescribed periods of time. Certain counties within the state have offered local tenure provisions, but no statewide tenure exists.

IDAHO

Teachers in Idaho work under a continuing contract law. If the local school board is not going to renew the teacher's contract, notice must be given before March 1st to the teacher in writing stating the reasons for termination. If no such notice is received, the teacher must notify the school board by April 1st that he desires an automatic renewal of his contract.

A teacher who receives a notice of non-reemployment shall be granted a hearing before the local board. The teacher may present evidence, examine persons who have spoken against him, and be represented by counsel. The board also has these rights.

ILLINOIS

Requirements for Tenure

Provisions differ for districts of less than 500,000 population, cities over 500,000 (Chicago) and those under a board of directors. The provisions for the City of Chicago vary somewhat from the statewide coverage.

In Chicago, the probationary period is three (3) years, during which time dismissal is upon recommendation of the superintendent who must give reasons for such dismissal.

In all other districts any teacher, employed in any district as a full-time teacher for a probationary period of two (2) consecutive years, shall enter upon contractual continued service unless given written notice of dismissal stating the specific reason by registered mail at least 50 days before the end of the school year.

If a teacher has not had one year of full-time teaching experience prior to the probationary period, the board may extend the probationary period for a third year.

Causes for Termination

Incompetency, cruelty, negligence, immorality, or other sufficient cause.

Procedure for Removal

Written notice must be given the teacher before November 1. Dismissal is only effective after a hearing before the board or a committee therefrom if the teacher requests. A majority vote by the board is required to dismiss.

Appeal Provisions

In Chicago, the decision of the local board is final.

In districts under 500,000 the teacher may appeal to the courts under the Administrative Review Act.

INDIANA

Requirements for Tenure

After receiving a contract for a sixth (6th) consecutive year in the same school district, the contract will be considered as an indefinite contract and the teacher will become a permanent teacher of that school corporation.

Causes for Termination

Incompetency, insubordination (which shall be deemed to mean a willful refusal to obey the school laws of the state or reasonable rules prescribed for the governing of the public schools by the local school corporation), neglect of duty, immorality, justifiable decrease in the number of teaching positions, or other good and just cause. Dismissal cannot be made for political, personal or marital reasons.

Procedure for Removal

Written notice must be given to the teacher of intention to dismiss. The teacher may request a hearing before the local school board with all legal rights of a hearing involved. The Superintendent of Schools must have given the board his recommendations. A majority vote of the school board is required to dismiss.

Appeal Provisions

No appeal; the school board's decision is final.

IOWA

Teachers sign annual contracts under the provisions of a Continuing Contract Law. The contract remains in force and effect if notice has not been given the teacher prior to April 15th. The teacher may, at the end of the year, protest nonrenewal of his contract and may demand a hearing before the local school board. The board decides whether to retain the teacher by a roll call vote; a majority is required.

KANSAS

Requirements for Tenure

Tenure applies only to teachers employed by public school systems in cities with a population over 120,000. According to the Kansas State Department of Public Instruction only Kansas City and Wichita come within this category. All other public school teachers are under Continuing Contract Law. There are approximately 21,000 teachers in the entire state. Of this number, 800 teachers are in the Kansas City system and 2,300 in the Wichita system.

A teacher attains tenure by serving for three (3) consecutive years in a school district and being rehired for a fourth (4th) year.

Causes for Termination

Immoral character, conduct unbecoming an instructor, insubordination, failure to obey reasonable rules promulgated by the Board of Education, marriage of women instructors, inefficiency, incompetency, physical unfitness, failure to comply with reasonable requirements of the Board of Education as may be prescribed to show normal improvement and evidence of professional training, decrease in number of students, and other causes over which the board has no control.

Procedure for Removal

A teacher may be removed only after a hearing before the local Board of Education, if the teacher so requests.

Appeal Provisions

No appeal; the local school board's decision is final.

KENTUCKY

Requirements for Tenure

The teacher must hold a standard college certificate from a four-year institution.

When the teacher is recommended for re-employment after teaching four (4) years in a district, the superintendent shall recommend the teacher for a continuing contract and unless the Board of Education by a four-fifths vote of its full membership rejects the continuing contract, one shall be issued.

If the board rejects the continuing contract, the superintendent may recommend employment under a limited contract not to exceed two (2) years, but upon subsequent re-employment only a continuing contract shall be entered into.

Causes for Termination

The contract shall remain in force during good behavior and efficient and competent service by the teacher and shall be terminated only for the following: Insubordination, immoral character, conduct unbecoming a teacher, inefficiency, incompetency, physical or mental disability, or neglect of duty.

Procedure for Removal

The superintendent must recommend termination. The teacher must be furnished with written charges against him. He may call for a full legal hearing before the board. The board decides by a majority vote.

Appeal Provisions

The teacher may appeal both as to law and as to fact to the circuit court.

Either party may appeal to the court of appeals from the circuit court's decision.

LOUISIANA

Requirements for Tenure

A certificated teacher serves a three (3) year probationary period during which he may be dismissed upon the written recommendation of the superintendent with valid written reasons. If at the end of the three years no such notification is given to the teacher, he automatically becomes a regular and permanent teacher.

Causes for Termination

Willful neglect of duty; incompetency; dishonesty; holding membership in or contributing to any group, organization, movement or corporation that is by law or injunction prohibited from operating in Louisiana; or holding membership in or contributing to any group advocating or in any manner performing any act toward bringing about integration of the races within the public school system or any public institution of higher learning.

Procedure for Removal

The teacher must be given written notice in advance of the charges against him and he can request a hearing before the local school board. He may be represented by counsel.

Appeal Provisions

The teacher may appeal the board's decision within one year to a court of competent jurisdiction for a full hearing to review the action of the school board.

MAINE

No tenure laws exist.

One of the enumerated duties of the local board of school directors is: After due notice and investigation, they shall dismiss any teacher, although having the requisite certificate, who proves unfit to teach or whose services they deem unprofitable to the school; and give to such teacher a certificate of dismissal and of the reasons therefore, a copy of which they shall retain, and such dismissal shall not deprive the teacher of compensation for previous services.

MARYLAND

No statewide tenure laws exist.

The City of Baltimore has established certain procedures which give teachers greater protection than is provided throughout the state, however, these provisions are not within the category of permanent tenure.

MASSACHUSETTS

Requirements for Tenure

Every school committee, in electing a teacher, who has served in its public schools for the three (3) previous consecutive school years, shall employ him to serve at its "discretion."

Causes for Termination

Inefficiency, incapacity, conduct unbecoming a teacher, insubordination, decrease in the number of pupils, or other good cause. Change of marital status is not grounds for dismissal.

Procedure for Removal

Every teacher serving at "discretion" must be given the right to have a hearing before the school committee. Proper written notification, including charges, must be given to the teacher in advance. The teacher may have counsel, call witnesses, present evidence, etc. The superintendent must give his written recommendations to the committee. A two-thirds vote of the entire committee is necessary to dismiss.

Appeal Provisions

No appeal provisions stated.

MICHIGAN

Requirements for Tenure

Teachers serving for the first two (2) years are considered to be in a period of probation. If the teacher is rehired at the end of those two years he is considered on continuing contract.

Causes for Termination

For reasonable and just cause.

Procedure for Removal

Written charges, signed by the person making those charges, must be filed with the Secretary of the Controlling Board at least 60 days prior to the end of the school year. If the board decides to proceed with these charges, a written notice must be given to the teacher. The teacher may request a hearing and it will be conducted with full legal rights to both parties. A majority vote of the board is necessary to dismiss.

Appeal Provisions

A teacher may appeal within 30 days to the State Tenure Commission. Their decision will be final.

Note: Any school district at any time may revoke this act in their district by a majority vote in any general or special election.

MINNESOTA

Requirements for Tenure

Tenure applies only to teachers in the public schools in cities of the first class, i.e. more than 50,000 inhabitants. According to the 1950 census only three Minnesota cities qualify for tenure: Minneapolis, Duluth and St. Paul.

If a teacher is rehired after a three (3) year probationary period, he then holds his contract during good behavior and efficient and competent service.

Causes for Dismissal

Immoral character; conduct unbecoming a teacher; insubordination; failure without justifiable cause to teach without first securing the written release of the school board or commissioner having the care, management or control of the school in which the teacher is employed; inefficiency; affliction with active tuberculosis or other communicable

diseases while teacher is suffering from such disability; discontinuance of position, or lack of pupils.

Procedure for Removal

Charges in writing must be given to the teacher in advance and he may request a hearing before the board. At the hearing anyone may have counsel, subpoena witnesses, introduce evidence, etc. A majority vote of the board is needed to dismiss.

Appeal Provisions

No appeal provisions stated.

MISSISSIPPI

No tenure laws exist.

The board of trustees of any school district shall have the power and authority to contract with a teacher for a period not exceeding three (3) scholastic years.

MISSOURI

Requirements for Tenure

Tenure applies only to cities of 500,000 inhabitants and over. According to the Missouri State Department of Education, the City of St. Louis is the only school district in that category. Other teachers in the state are under the provisions of a continuing contract law. There are 29,425 certified teachers in the entire state. There are 3,227 teachers in St. Louis City.

If the teacher is rehired at the end of a three (3) year probationary period, then he is deemed on continuing contract. A teacher may be dismissed at any time prior to that. However, in the case of incompetency, a teacher must be given six months in which to improve.

Causes for Termination

Immorality, inefficiency in the line of duty, violation of the published regulations of the school district, violation of Missouri law, physical or mental disability.

Procedure for Removal

The charges must be presented to the teacher in writing. The teacher may demand a full hearing before the board with all legal rights. A majority vote of the board is needed to terminate.

Appeal Provisions

The action and decision of the local school board is final.

MONTANA

Requirements for Tenure

A certificated teacher upon election to a fourth (4th) consecutive year in any school district shall be deemed to have tenure.

Causes for Termination

No specific causes stated.

Procedure for Removal

The board must notify the teacher before the first day of April that he will not be retained. The board must declare clearly and explicitly the specific reason or reasons for the failure to re-employ. The teacher may ask the board to reconsider in a special hearing. The board decides by a majority vote.

Appeal Provisions

The teacher may appeal to the county superintendent if he has been removed because of alleged immorality, unfitness, incompetency, or violation of the rules. The county superintendent may reverse or approve the decision of the local board. Appeal may also be made to the state superintendent or to the courts.

NEBRASKA

Requirements for Tenure

Tenure applies only to teachers employed by public school districts with a population of more than 50,000 that maintain both elementary and high school grades under the direction of a single board of education. According to the Nebraska State Department of Education, only two cities fall within this category: Lincoln and Omaha. The total number of teachers in Nebraska is 14,000. There are approximately 3,338 teachers in the Omaha and Lincoln school districts.

Tenure becomes automatic if a teacher is rehired for a fourth (4th) consecutive year provided that the school board does not extend the probationary period for one or two additional years.

Causes for Termination

Incompetency; physical disability or weakness of any type which interferes with performance of duty; insubordination which shall be deemed a willful refusal to obey the school laws of the state, the rulings of the superintendent of public instruction, or reasonable rules and regulations prescribed for the government of the schools of the district by the school board; neglect of duty; immorality; failure to give evidence of professional growth; justifiable decrease in number of teaching positions; or other good and just cause. Termination may not be made for political or personal reasons.

Procedure for Removal

If the teacher so requests, after having been duly notified by the local board of intention to terminate the tenure, the local school board must hold a full hearing on the matter.

Appeal Provisions

No appeal; the local school board's decision is final.

NEVADA

Teachers contract under the provisions of a continuing contract law. A teacher must be notified by May 1st that he is not to be re-employed for the ensuing year; failure to so notify constitutes re-employment for the coming year.

NEW HAMPSHIRE

Requirements for Tenure

Tenure is attained by having a professional standards certificate from the state board of education and having taught for three (3) or more years in the same school district.

Causes for Termination

Immoral or incompetent; does not conform to regulations prescribed; failure to sign a loyalty oath.

Procedure for Removal

Notification in writing to the teacher setting forth the charges is required. The teacher may request a hearing before the board. The board has 15 days after the hearing to issue its decision.

Appeal Provisions

The teacher may request the state board of education for a review of the case. The state board's decision is final and binding.

NEW JERSEY

Requirements for Tenure

Tenure is attained by being a certified teacher and having taught three (3) consecutive years in the same school district.

Causes for Termination

Inefficiency, incapacity, conduct unbecoming a teacher, or other just cause. The following are not causes for dismissal: Residence, age, sex, marriage, race, religion, or political affiliation.

Procedure for Removal

Anyone may prefer charges in writing to the school board. Such charges will be made available to the teacher if the board decides to dismiss on the basis of the charges. The board must hold a hearing, if the teacher requests, to fully investigate the matter. Full legal rights are conferred upon the hearing.

Appeal Provisions

No appeal provisions stated.

NEW MEXICO

Requirements for Tenure

Tenure is attained by being a certified teacher who has taught for three (3) consecutive years in the same school district and is rehired for a fourth (4th) year.

Causes for Termination

Any such causes specified in the uniform contract approved by the State Board for New Mexico School Teachers or any other good and just cause.

Procedure for Removal

After receiving a statement of written charges against him, the teacher may request a full hearing before the local school board. The hearing will conform to all legal procedures.

Appeal Provisions

The teacher may appeal the governing board's decision to the State Board for New Mexico School Teachers. This board reviews the case and accepts or rejects the appeal. If accepted, another full hearing is held before the state board.

Either party may appeal the state board's decision to the district court, at which time a trial de novo of all matters of law and fact shall be held.

NEW YORK

Tenure coverage is statewide, although provisions differ in districts of different sizes throughout the state: in cities of 1,000,000 or more (New York City); in cities of 400,000 or more; in union free school districts with a population of more than 4,500 and employing a superintendent; and in districts employing eight or more teachers, other than city school districts and those having populations of 4,500 and employing a superintendent.

Requirements for Tenure

The probationary period is five years in rural districts; from one to three years in all other districts. In cities the local school board may fix the probationary period anywhere from one to three years.

Causes for Termination

Following the probationary period, teachers serve during good behavior and efficient service. Although some differences exist between the various districts as to the specific reasons for dismissal, the following are the usual criteria for termination: conduct unbecoming a teacher, inefficiency, incompetency, physical or mental disability, neglect of duty, immoral character, or insubordination.

Procedure for Removal

Dismissal procedures vary in the several classes of districts. In New York City the board may appoint a committee of one or more members or a trial examiner. The penalty may be a reprimand, a fine, suspension for a fixed time without pay, or dismissal. The report of the trial examiner or the committee is subject to final action by the board with all members voting.

In cities of 400,000 population and in other cities, the teacher is allowed a hearing before the local school board although the procedure is not detailed in the law.

In union free school districts with a population of more than 4,500 and employing a superintendent, and in districts employing eight or more teachers, other than those covered under other provisions, the teacher is entitled to a full hearing before the local school board. He is allowed all legal provisions in connection with this hearing. These legal provisions are delineated in the statutes.

Appeal Provisions

Appeals in all cases, except a few rural districts, may be made to either the State Tenure Commission, the Commissioner of Education, or by certiorari to the courts.

NORTH CAROLINA

No tenure laws exist.

State law provides for the employment of teachers holding teaching certificates by contract with the local school agencies. The length of the contract may not exceed 12 months.

NORTH DAKOTA

No tenure laws exist.

State law provides for the employment of teachers holding teaching certificates by contract with the local school boards. The length of the contract may not exceed eighteen months.

OHIO

Requirements for Tenure

Teacher tenure does not apply to school districts of less than 800 pupils unles the local school board so desires.

A professional, permanent or life teacher's certificate is required.

The superintendent recommends those teachers for continuing contracts who have been employed by the school district for at least three (3) years during the past five (5) years. Unless the board by a three-quarters vote of its full membership rejects such recommendation, the teacher is considered on a continuing service status.

Causes for Termination

Gross inefficiency; immorality; willful and persistent violations of reasonable regulations of the board of education; advocate or maintain membership in any organization which advocates overthrow of the U. S. Government by force, violence or other unlawful means; or other good and just cause.

Procedure for Removal

The board must give written notification to the teacher, who has 10 days in which to ask the board for a hearing. The hearing will be private unless the teacher asks for a public hearing. The board by a majority vote may terminate the contract. If the decision is for the teacher, the record of the hearing shall be physically expunged from the minutes.

Appeal Provisions

The teacher may appeal to the court of common pleas of the county in which the school is located. The board must submit the transcript of the previous hearing to the court. The court may hold further hearings if it so desires.

Either party may appeal to higher courts from this decision.

OKLAHOMA

Teachers operate under a continuing contract law.

Contracts are negotiated on an annual basis. If the teacher is not notified prior to April 10th that he is not to be rehired, he may consider that his contract has been automatically renewed.

OREGON

Requirements for Tenure

Applies only when the average daily attendance of any school district exceeds 4,500 pupils. According to the Oregon State Department of Education, the following school districts qualify for the application of the tenure law: Portland, Salem, Eugene, Medford, Springfield, Klamath Falls Union High School, Klamath Falls County Unit, Lincoln County Unit, and Roseburg. There are approximately 5,424 teachers in the above-named districts. In 1956-57 there were a total of approximately 15,354 teachers in the State of Oregon.

A teacher rehired after three (3) consecutive years of teaching in the same school district is deemed to have tenure. Annual appointments after this are unnecessary.

Causes for Termination

Inefficiency, unbecoming conduct, insubordination, neglect of duty, failure to comply with such reasonable requirements of the school board as may be prescribed to show normal improvement and evidence of professional training and growth.

Procedure for Removal

A superintendent of schools must recommend dismissal. However, if 10 persons from 10 different families file written complaints with the superintendent and he does not act, they may go directly to the board.

If the teacher requests, the board will hold a full legal hearing that will be private unless the teacher requests a public hearing. No minors will be allowed except as witnesses. A majority vote of the board is required to dismiss.

Appeal Provisions

The teacher has the right to appeal to the teacher's tenure commission. However, if the teacher applies to the courts for a writ of review, the right to appeal to the commission is abdicated.

PENNSYLVANIA

Requirements for Tenure

At the end of two (2) years of satisfactory service the school board shall offer the teacher a continuing contract.

Causes for Termination

Immorality; incompetency; intemperance; cruelty; persistent negligence; mental derangement; advocation of or participating in un-American or subversive doctrines; persistent and willful violations of the school law of the commonwealth; substantial decrease in pupil enrollment; curtailment of the educational program offered; and con-

solidation of schools making it unnecessary to retain professional employees.

In determining whether a professional employee shall be dismissed for incompetency, the professional employee shall be rated by an approved rating system which shall give due consideration to personality, preparation, technique and pupil reactions. Rating cards will be prepared by the Department of Public Instruction. Ratings are done by or under the supervision of the superintendent of schools.

Procedure for Removal

A written statement of charges must be presented to the teacher. If the teacher requests, the board will conduct a hearing, at which counsel and other legal rights may be utilized. A two-thirds vote on a rollcall of all members is necessary to discharge.

If the decision is for the teacher, the transcript will be physically expunged from the record.

Appeal Provisions

The teacher may appeal to the Superintendent of Public Instruction.

The teacher or the board may appeal the superintendent's decision to the court of common pleas of the county in which the school district is located. The trial may be de novo on the request of the teacher.

RHODE ISLAND

Requirements for Tenure

Tenure is attained by a certified teacher after having served three (3) successive annual contracts and is rehired for a fourth (4th) year.

Causes for Termination

Good and just cause.

Procedure for Removal

A written statement of cause for dismissal must be given to the teacher one month before the end of the school year. The teacher may request a hearing before the board. The hearing can be public or private, in the discretion of the teacher. Both the board and the teacher are entitled to counsel, call witnesses, cross-examination, etc.

Appeal Provisions

The teacher may appeal to the State Department of Education and further appeal to the superior court.

SOUTH CAROLINA

No tenure laws exist.

Teachers contract with the local school boards for prescribed periods of time only.

SOUTH DAKOTA

Teachers operate under the provisions of Continuing Contract Law.

Any teacher employed for two consecutive years by the same school board must be notified prior to April 1st of the board's decision not to renew the contract. Failure to do so constitutes automatic renewal.

TENNESSEE

Requirements for Tenure

Tenure is attained by: holding a degree from a four-year college; holding a professional certificate from the state; having served a probationary period of three (3) years within the last five-year period within the same school district.

Causes for Termination

Incompetency. Being incapable; lacking adequate power, capacity or ability to carry out the duties and responsibilities of the position. May be physical, mental, educational or emotional. Inability to command respect from subordinates or to secure co-operation of those with whom he must work.

Neglect of Duty. Gross or repeated failure to perform duties and responsibilities which reasonably can be expected of one in such a capacity; continued unexcused or unnecessary absence from duty.

Conduct Unbecoming a Teacher. Immorality, conviction of a felony or crime involving moral turpitude; dishonesty; unreliability; continued failure or refusal to pay one's just and honest debts; disregard of the Code of Ethics of the Tennessee Education Association in such manner as to make one obnoxious as a member of the profession; improper use of narcotics or intoxicants.

Insubordination. Refusal or failure to obey laws of Tennessee; failure to participate in an in-service training program as set up by the local board of education and approved by the State Board of Education; treason; membership in any party or organization which advocates overthrow of the government.

Procedure for Removal

The board must furnish the teacher with a statement of written charges as to why his services are to be terminated. The teacher may have a full legal hearing before the board.

The cost of all proceedings is paid by the losing party.

Appeal Provisions

The teacher may file within 30 days from the board's decision, a petition in the Chancery Court of the county where the teacher was employed.

Either party may, upon giving bond as required by law in other chancery causes, appeal to the Supreme Court.

NOTE: **Limited Tenure** may be granted to teachers who have completed two years of college, who have a professional certificate and who have taught for three (3) years within the local school district. The teacher must acquire 12 quarter hours of college credit during the three-year period. If so, "limited tenure" may be extended another three years. If not, "limited tenure" is lost. This may continue until the teacher has a B.A. degree and then the teacher will be awarded permanent tenure. "Limited Tenure" carries with it all the procedural safeguards of permanent tenure.

TEXAS

No tenure laws exist.

Teachers contract with the local school agencies for prescribed periods of time and are subject to dismissal at the end of each contract period.

UTAH

No tenure laws exist.

School boards may employ teachers by contracts for periods not to exceed five (5) years, and with the proviso that the board may terminate the contract for cause at any time.

VERMONT

No tenure laws exist.

School superintendents may dismiss teachers who, in their judgment, are incompetent or unfit for the position. Such dismissal shall be in writing. One copy goes to the teacher and one to the chairman of the board of school directors; and thereupon such teacher's contract shall be void.

VIRGINIA

No tenure laws exist.

Teachers contract with the local school boards for prescribed periods of time.

WASHINGTON

Teachers are under the provisions of a continuing contract law.

Washington teachers contract on an annual basis. The teacher must be notified prior to April 15th that he is not to be rehired. Causes for non-reemployment must be stated. If no such notice is given, the teacher may consider himself automatically rehired.

If such notice of non-reemployment is given, the teacher may request a hearing before the local school board. He is entitled to counsel, to witnesses, to present evidence, etc. The board has five days to reach a decision and that decision must be based solely upon the cause or causes for nonrenewal specified in the notice to the teacher and proved and established at the hearing.

WEST VIRGINIA

Requirements for Tenure

Tenure is attained by being rehired for a fourth (4th) year following three (3) consecutive years in the school district.

Causes for Termination

Immorality, incompetency, cruelty, insubordination, intemperance, willful neglect of duty, decrease in pupil registration causing a need for fewer teachers, or failure to take an oath of allegiance to the United States and the Constitution.

Procedure for Removal

Written notice from the school board must be received by the teacher prior to April 1st, stating the causes for such action. The teacher may request a hearing before the board. A majority vote of the board is required to dismiss.

Appeal Provisions

When the board is not unanimous in its decision to dismiss, the teacher has the right to appeal to the State Superintendent of Schools.

WISCONSIN

Requirements for Tenure

Tenure applies to only cities of the first class and/or to counties having a population of 500,000 or more. As a result, the City of Milwaukee and the County of Milwaukee are the only areas in the state where the tenure law is applicable. Of the approximately 27,000 certified teachers in the State of Wisconsin, there are approximately 4,900 in Milwaukee County.

A certified teacher becomes permanent when he is rehired for a fourth (4th) year in the same school district.

Causes for Termination

Inefficiency, immorality, willful and persistent violation of reasonable regulations of the governing board of the school, or other good and just causes.

Procedure for Removal

Written charges must be presented to the governing board, who will hold a hearing if the teacher so desires. Full legal rights will be provided.

Appeal Provisions

No appeal; the local school board's decision is final.

WYOMING

No tenure laws exist.

It is the duty of the County Superintendent of Schools to recommend the dismissal of any teacher he finds to be incompetent by making written charges to the school board. The board will hold a hearing to see if the charges are valid. If they so find, then the teacher is dismissed.

CHART SHOWING FACTORS DEVELOPED BY SURVEY

State	Tenure provisions	Probationary years required	Causes for dismissal	Initial hearing body	Appeal provisions
Alabama	Permanent	3	Specific	Local board	State Tenure Commission; then to Circuit Court
Alaska	Continuing contract				
Arizona	Permanent	3	Not specified	Local board	Superior court
Arkansas	Continuing contract				
California*	Permanent	3	Specific	Superior court	Higher courts
Colorado	Permanent	3	Specific	Special local panel	State Commissioner of Education
Connecticut	Permanent	3	Specific	Local board	No provisions stated
Delaware	Permanent	3	Specific	Local board	Superior court
Florida	Permanent	3	Not specified	Local board	Through State Superintendent of Schools to State Board of Education
Georgia	None				
Idaho	Continuing contract				
Illinois	Permanent	2	Specific	Local board	The courts
Indiana	Permanent	5	Specific	Local board	No appeal; local board final
Iowa	Continuing contract				
Kansas†	Permanent	3	Specific	Local board	No appeal; local board final
Kentucky	Permanent	4	Specific	Local board	The courts
Louisiana	Permanent	3	Specific	Local board	The courts
Maine	None				
Maryland	None				
Massachusetts	Permanent	3	Specific	Local board	No provisions stated
Michigan	Permanent	2	Not specified	Local board	State Tenure Commission
Minnesota†	Permanent	3	Specific	Local board	No provisions stated
Mississippi	None				
Missouri†	Permanent	3	Specific	Local board	No appeal; Local board final
Montana	Permanent	3	Not specified	Local board	County Superintendent
Nebraska†	Permanent	3	Specific	Local board	No appeal; local board final
Nevada	Continuing contract				
New Hampshire	Permanent	3	Specific	Local board	State Board of Education
New Jersey	Permanent	3	Specific	Local board	No provisions stated
New Mexico	Permanent	3	Specific	Local board	State Board for New Mexico School Teachers; then to District court
New York*	Permanent	3	Specific	Local board	State Board of Education; then to Commissioner of Education
North Carolina	None				
North Dakota	None				

Ohio†	Permanent	3	Specific	Local board	The courts
Oklahoma	Continuing contract				
Oregon†	Permanent	3	Specific	Local board	State Tenure Commission or the courts
Pennsylvania	Permanent	2	Specific	Local board	Superintendent of Public Instruction; then to County court
Rhode Island	Permanent	3	Not specified	Local board	State Department of Education; then to superior court
South Carolina	None				
South Dakota	Continuing contract				
Tennessee	Permanent	3	Specific	Local board	The courts
Texas	None				
Utah	None				
Vermont	None				
Virginia	None				
Washington	Continuing contract				
West Virginia	Permanent	3	Specific	Local board	State Superintendent of Schools
Wisconsin†	Permanent	3	Specific	Local board	No appeal; local board final
Wyoming	None				

* New York and California have several different categories of tenure. Listed here is the type applicable to most teachers; see state by state tabulation for other categories.
† Tenure does not cover all teachers within the state but is applicable to school districts based on minimum population requirements.

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REPORT OF THE

SUBCOMMITTEE ON HIGHER EDUCATION BEYOND THE TWELFTH GRADE

OF THE

ASSEMBLY INTERIM COMMITTEE ON EDUCATION

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March, 1959

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COMMITTEE LETTER OF TRANSMITTAL

ASSEMBLY INTERIM COMMITTEE ON EDUCATION
ROOMS 3102-3114, STATE CAPITOL
SACRAMENTO, March 10, 1959

HON. RALPH M. BROWN
Speaker of the Assembly, and
Members of the Assembly
Assembly Chamber, Sacramento

GENTLEMEN: Pursuant to House Resolution No. 285 of the 1957 Regular Session, the Assembly Interim Committee on Education herewith submits its final report from its Subcommittee on Higher Education, Beyond the Twelfth Grade.

Respectfully submitted,

DONALD D. DOYLE, Chairman
Interim Committee on Education

SUBCOMMITTEE LETTER OF TRANSMITTAL

ASSEMBLY, CALIFORNIA LEGISLATURE
SACRAMENTO, March 10, 1959

HON. DONALD D. DOYLE
Assembly Interim Committee on Education
Assembly Chamber, Sacramento

DEAR MR. DOYLE: Pursuant to the general authority of House Resolution No. 285 of the 1957 Regular Session, under which you appointed this Subcommittee on Higher Education, we herewith submit our final report.

Respectfully submitted,

Subcommittee on Higher Education
HAROLD T. SEDGWICK, Chairman
CARLOS BEE
GEORGE G. CRAWFORD
LOU CUSANOVICH
RICHARD HANNA
SHERIDAN HEGLAND

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SCOPE OF THE REPORT

The Subcommittee on Higher Education Beyond the Twelfth Grade was created under the general authority of House Resolution 285 of the 1957 Regular Session of the California State Legislature.

During the interim period the subcommittee conducted studies and held hearings on two different aspects of higher education in the State of California. Although these two aspects were handled as separate topics during the interim period, they are combined within this report because of the relatedness of the subject matter.

House Resolutions Nos. 202 and 304 directed the subcommittee to study the need for the establishment of state colleges in the Counties of San Mateo, San Bernardino, Monterey, San Benito and Santa Cruz. The subcommittee's findings, recommendations and complete study on proposed state colleges are shown in this report as Part I.

Hearings were held on August 13 and 14, 1958, at Fresno regarding the creation of a board for the governing of the state colleges of California. Testimony heard on those dates and background material gathered by the subcommittee staff forms the basis of this part of the report. An attempt has been made to delineate the problem areas of the state colleges at the present time and to outline the tremendous growth these institutions have undergone in the past 10 years.

The findings, recommendations, and complete study on the subject of a proposed State College Board are shown in this report as Part II.

FINDINGS

PART I. PROPOSED STATE COLLEGES

1. The rapid growth of the San Mateo County area makes the immediate establishment of a state college in San Mateo imperative.

2. The rapid growth of the San Bernardino-Riverside County area makes it imperative that a state college be established in this area in the near future.

3. The expected future growth of the Monterey-San Benito-Santa Cruz County area makes it imperative that future legislative committees closely study this area with regard to the establishment of a state college in the future.

PART II. PROPOSED STATE COLLEGE BOARD

1. The rapid growth of the state college system in California has made the present administrative and governing boards inadequate to care for the many new needs involved in this large expansion.

2. The State Board of Education has so many duties and responsibilities in governing the elementary and secondary schools of California that the board cannot devote sufficient time or energy to adequately govern the state colleges.

3. Further and continuing study needs to be given by the Legislature in outlining the specific functions and inter-relations of junior colleges, state colleges, and the University of California in regard to public higher education in California.

RECOMMENDATIONS

PART I. PROPOSED STATE COLLEGES

1. The State Legislature should appropriate the necessary funds for the purchase of a state college site in San Mateo County.
2. The State Legislature should immediately authorize the establishment of a state college in San Mateo County.
3. The State Legislature should appropriate the necessary funds for the purchase of a site for a state college in San Bernardino County.
4. The State Legislature should instruct the Assembly Interim Committee on Education to closely study the San Bernardino-Riverside County area so that a state college can be established in the San Bernardino-Riverside County area at the appropriate time.
5. The State Legislature should instruct the Assembly Interim Committee on Education to closely study the Monterey-San Benito-Santa Cruz County area so that future recommendations can be made at an appropriate time for the purchase of a state college site in this three-county area.

PART II. PROPOSED STATE COLLEGE BOARD

1. A separate board for the governing of the state colleges in California should be established by enactment of the Legislature.
2. The Legislature should direct the 1959 Assembly Interim Committee on Education to ascertain, study, and analyze all facts relating to the role, functions, and inter-relations of junior colleges, state colleges, and the University of California in relation to the field of higher education.

CALIFORNIA LEGISLATURE, 1959 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 392

Introduced by Messrs. Sedgwick, Hanna, Bee, Hegland, Crawford, and Cusanovich

January 19, 1959

REFERRED TO COMMITTEE ON EDUCATION

An act to add Article 5 (commencing at Section 220) to Chapter 1, Division 1 of the Education Code, and Chapter 5 (commencing at Section 551) to Division 2 of the Education Code, as proposed by Senate Bill No. 2, establishing a state college board and prescribing its function.

The people of the State of California do enact as follows:

SECTION 1. Article 5 (commencing at Section 220) is added to Chapter 1, Division 1 of the Education Code, to read:

Article 5. State College Board

220. There is hereby created within the Public School System in the State Government a State College Board, consisting of nine members. The Superintendent of Public Instruction, acting ex officio, shall be a member. The remaining eight members shall be appointed by the Governor with the advice and consent of two-thirds of the Senate. The Governor shall select appointees in such a manner that all geographical areas of the State are represented on the board. No person shall be appointed who at the time holds any salaried educational position or who is a member of a state college advisory board.

LEGISLATIVE COUNSEL'S DIGEST

A. B. 392 as introduced, Sedgwick (Ed.). State college board.

Adds Art. 5 (commencing at Sec. 220), Ch. 1, Div. 1, Ed. C., and Ch. 5 (commencing at Sec. 551), Div. 2, Ed. C., as proposed by S. B. 2.

Creates a new state college board of nine members. Makes the Superintendent of Public Instruction, acting ex officio, a member and requires the Governor to appoint the remaining 8 members, for 4-year terms, with the advice and consent of the Senate.

Transfers to the new board, on and after October 1, 1959, all of the powers and duties of the State Board of Education, the Superintendent of Public Instruction, the Department of Education and the Director of Education with respect to state colleges.

Allows the new board to appoint a chief administrative officer, and prescribes his duties.

221. The terms of the appointive members of the board shall be four years, except as otherwise provided in this section, and they shall hold office until the appointment and qualification of their successors. The terms of the first appointive members shall be fixed by the Governor and in such manner as will provide for the expiration each year of the terms of one-fourth of the members.

222. Any vacancy in the office of an appointed member shall be filled by appointment by the Governor, subject to confirmation by two-thirds of the Senate. The appointee to fill a vacancy shall hold office only for the balance of the unexpired term.

223. At the first meeting of the board, and at the first meeting following any change in the membership of the board, the board shall organize or reorganize by electing one of its members president.

224. Members of the board shall serve without pay. They shall receive their actual and necessary traveling expenses while on official business.

225. On and after October 1, 1959, all of the powers, duties, and responsibilities of the State Board of Education, of the Superintendent of Public Instruction, of the Department of Education, and the Director of Education, with respect to state colleges are hereby transferred to the State College Board.

226. The board may appoint a chief administrative officer, who shall serve at the pleasure of the board. The Legislature hereby requests the State College Board to designate the chief administrative officer as the person holding the position confidential to it, within the meaning of subdivision 5, of Section 4, Article XXIV of the Constitution. His salary shall be fixed by the board, with the approval of the Director of Finance.

227. The chief administrative officer shall act as secretary of the board, and shall execute, under direction of the State College Board, the policies which have been decided upon by the board and shall direct, under general rules and regulations adopted by the State College Board, the work of all appointees and employees of the board.

SEC. 2. Chapter 5 (commencing at Section 551) is added to Division 2 of the Education Code, as proposed by Senate Bill No. 2, to read:

CHAPTER 5. STATE COLLEGE BOARD

551. There is hereby created within the Public School System in the State Government a State College Board, consisting of nine members. The Superintendent of Public Instruction, acting ex officio, shall be a member. The remaining eight members shall be appointed by the Governor with the advice and consent of two-thirds of the Senate. The Governor shall select appointees in such a manner that all geographical areas of the State are represented on the board. No person

shall be appointed who at the time holds any salaried educational position or who is a member of a state college advisory board.

552. The terms of the appointive members of the board shall be four years, except as otherwise provided in this section, and they shall hold office until the appointment and qualification of their successors. The terms of the first appointive members shall be fixed by the Governor and in such manner as will provide for the expiration each year of the terms of one-fourth of the members.

553. Any vacancy in the office of an appointed member shall be filled by appointment by the Governor, subject to confirmation by two-thirds of the Senate. The appointee to fill a vacancy shall hold office only for the balance of the unexpired term.

554. At the first meeting of the board, and at the first meeting following any change in the membership of the board, the board shall organize or reorganize by electing one of its members president.

555. Members of the board shall serve without pay. They shall receive their actual and necessary traveling expenses while on official business.

556. On and after October 1, 1959, all of the powers, duties, and responsibilities of the State Board of Education, of the Superintendent of Public Instruction, of the Department of Education, and the Director of Education, with respect to state colleges are hereby transferred to the State College Board.

557. The board may appoint a chief administrative officer, who shall serve at the pleasure of the board. The Legislature hereby requests the State College Board to designate the chief administrative officer as the person holding the position confidential to it, within the meaning of subdivision 5, of Section 4, Article XXIV of the Constitution. His salary shall be fixed by the board, with the approval of the Director of Finance.

558. The chief administrative officer shall act as secretary of the board, and shall execute, under direction of the State College Board, the policies which have been decided upon by the board and shall direct, under general rules and regulations adopted by the State College Board, the work of all appointees and employees of the board.

SEC. 3. Section 2 of this act shall become operative only if the Education Code as proposed by Senate Bill No. 2 is enacted by the Legislature at its 1959 Regular Session, and in such case at the same time as Senate Bill No. 2 takes effect; at which time Article 5 (commencing with Section 220) of Chapter 1, Division 1 of the Education Code as added by Section 1 of this act is repealed.

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RESOLUTION FOR STUDY OF FUNCTIONS OF JUNIOR COLLEGES, STATE COLLEGES AND THE UNIVERSITY

HOUSE RESOLUTION NO. ____

Relative to the Assembly Interim Committee on Education.

Resolved by the Assembly of the State of California, That the Assembly Interim Committee on Education (created by House Resolution No. ____ of the 1959 Regular Session), in addition to the other studies required to be made by it, is directed to ascertain, study and analyze all facts relating to but not limited to the functions of the University of California, the several state colleges, and the junior colleges in this State, and the present positions and roles of those institutions in the structure of the system of higher education prescribed by the California Constitution and the State's statutory law in the light of the problems confronting modern society, with the view of determining whether the present system of higher education is fully adapted to meet the present and future needs of the State and Nation, and to include its findings and recommendations in its report to the Legislature for the 1961 Regular Session, including in its report its recommendations for appropriate legislation.

FULL REPORT

PART I. PROPOSED STATE COLLEGE SITES

The subcommittee gathered information from interested and qualified individuals in San Mateo, San Bernardino, Monterey, San Benito and Santa Cruz Counties in an attempt to determine the need for state colleges in these counties. Hearings were held in Redwood City (San Mateo County) on October 20, 1958; San Bernardino (San Bernardino County) on December 1, 1958; and Monterey (Monterey, San Benito and Santa Cruz Counties) on December 15, 1958.

The conclusions, recommendations and findings of the subcommittee are based on the facts presented to the subcommittee at the hearings mentioned above. For the purposes of conciseness and clarity this report has been divided into three sections. Section 1 deals with San Mateo County; Section 2 covers San Bernardino-Riverside Counties; and Section 3 concerns Monterey, San Benito, and Santa Cruz Counties.

PART I

PROPOSED STATE COLLEGE SITES

SECTION 1
SAN MATEO COUNTY

San Mateo County ranks second in rate of growth of counties in the entire nation. Population studies clearly indicate this increase will continue.

Population in the county has increased from 235,000 in 1950 to 400,000 in 1958. This increase of over 70 percent has been approximately twice the percentage increase in the entire State of California. San Mateo County has grown during the last five years at the rate of approximately 20,000 persons a year, or 400 people a week.

With more land being made available for housing and industry, it is expected that the population of the county will be approximately 500,000 in 1960 and 690,000 in 1970. The following table, prepared by the San Mateo County Planning Department, shows the population growth from 1950 through 1958 and the projected population growth for the years 1960, 1965 and 1970.

San Mateo County Population Growth

1950	235,000
1955	345,000
1958	400,000
1960	450,000
1965	575,000
1970	690,000

J. Slaten Jenner, Chief, State and Community Assistance Division, U. S. Department of Commerce, and head of the Special Economic Study being done on the San Francisco Bay area for the U. S. Corps of Engineers, stated on September 30, 1958, at a meeting in San Mateo County:

> "I expect that there will be nearly three and three-fourths million people in the Bay area in 1960. By some time between 1980 and 1990 that number will have doubled and by 2010 it will have quadrupled, with 14,000,000 people living in the nine Bay counties.
>
> "Between now and the year 2010 the central cities of San Francisco and Oakland will continue to grow, but slowly. Until about 1970, the most rapid growth in the Bay area will take place in San Mateo County and in Santa Clara County, just as it has been in the past.
>
> "What will be the effect of this population pattern on the distribution of population in the Bay area by the year 2010? It means that more than three-quarters of the population of the Bay area will be living in areas outside the central cities where more than 50 percent lived in 1950. It means that Santa Clara County, with

nearly 3,000,000, will be the most populous county, and it means that San Francisco, with a little over 900,000 people, will be the least populous city. San Mateo County will have a population of at least one and one-half million, and it may come to have two million or even more."

PRESENT AND FUTURE ENROLLMENTS IN SCHOOLS IN SAN MATEO COUNTY

Enrollment figures in San Mateo County Schools as of October 31, 1957, are shown in Table No. 1 on page 44 of this report. At the present time there are over 65,000 students in grades kindergarten through eighth, and approximately 20,000 in the county's seven high schools. Illustrations of the explosive growth in the county can be seen by the following figures. There are currently 3,187 students in the twelfth grade; 5,100 pupils are enrolled in the eighth grade; and 9,000 children are presently in kindergarten. Readily apparent from these figures are the many difficult problems which will arise in educating those children who are now in kindergarten.

PROJECTED ENROLLMENTS IN SAN MATEO COUNTY SCHOOL DISTRICTS

Table No. 2 on page 46 of this report shows the past and future enrollments of grades kindergarten through 12 in the San Mateo County School District. In 1951 there were only 44,000 students enrolled in the county. Presently there are 83,000 students enrolled. By 1965 it is estimated that some 125,000 students will be enrolled in San Mateo schools. The San Mateo County Superintendent of Schools stated that in the future there will be an increase in the number of students graduating from high school as compared to the present ratios of today. The following table shows some projections for the years 1962-1970 of graduates from public high schools in the county.

Graduates From Public High Schools, San Mateo County, 1962-1970

1962	7,308	1967	12,346
1963	8,088	1968	13,170
1964	9,255	1969	13,980
1965	10,027	1970	14,875
1966	11,218		

EXPECTED ENROLLMENTS AT A SAN MATEO COUNTY STATE COLLEGE

The Office of the Santa Clara County Superintendent of Schools has made projections on expected enrollment if and when a state college is constructed in San Mateo County. See Table No. 3 on page 47. These projected enrollment figures are based on the assumption that a certain percentage of the graduates from San Mateo County high schools, as well as a certain percentage of graduates from high schools in Santa Clara and other surrounding counties, will attend a local college.

Table No. 4 on page 48 shows the projected regular enrollment by class level to 1970 for a contemplated state college in San Mateo County. Table No. 4 is based on figures used in Table No. 3.

ACTIVITIES OF SAN JOSE AND SAN FRANCISCO STATE COLLEGES IN SAN MATEO COUNTY

Figures presented to the subcommittee show that 730 San Mateo County residents are students at San Francisco State College. Some 918 San Mateo County students are registered at San Jose State College. It is reasonable to assume that the large majority of these 1,648 students attending San Francisco and San Jose State Colleges would attend a state college in San Mateo County if one were established. During the 1958 spring semester, San Francisco State College offered six courses in their extension program in San Mateo County; 229 students were enrolled in this program. During the same semester, San Jose State College offered nine courses through their extension program in San Mateo County; 320 students participated in these courses.

ACTIVITIES OF THE UNIVERSITY OF CALIFORNIA IN SAN MATEO COUNTY

The University of California Extension Division offered San Mateo County residents classes in 11 subject fields during the 1957-58 scholastic year. A total of 985 students registered for these classes. This program included not only classes but also discussion groups and a continuing education program of the California State Bar Association. Through the University Extension Service some 422 students were enrolled in correspondence courses.

Dr. Ernest A. Englebert, Director of the University Extension Division, testified before the subcommittee that there had been a marked increase in enrollments from San Mateo County in the past few years. He said he fully expects this increase to continue in the coming years.

In summary then, a total of 609 San Mateo County residents were enrolled in extension courses from San Francisco State and San Jose State Colleges during the spring of 1958. One thousand four hundred seven San Mateo County residents were enrolled in extension or correspondence courses from the University of California during the year 1957-1958. These figures clearly indicate the great desire of San Mateo residents for further education. Also clearly indicated is the great need for a state college in the San Mateo County area. Although extension courses are of great merit and usefulness, particularly when local college facilities do not exist, they are no substitute or replacement for regular college work.

SECTION 2
SAN BERNARDINO COUNTY

San Bernardino County is the largest county in California and comprises approximately one-eighth of the total area of the State. There are some 20,160 square miles in the county, of which about 70 percent are owned by the Federal Government. Recently, however, the Bureau of Land Management of the Federal Government has actively undertaken a program of the disposal of government land. For example, during the past several years 25,000 small tracts of land have been released by the government for building and improvement by individual citizens. This program is expected to continue in the future.

The county has a population of approximately 477,000 people. Nearly 400,000 of these people live in the San Bernardino Valley, an area of approximately 450 square miles, bounded on the west by Los Angeles County and on the south by San Diego and Riverside Counties. The rapid expansion of population in San Bernardino County is fully expected to continue for many years.

One of the largest industrial developments in the Western United States is the Kaiser steel plant located at Fontana. Thousands of new homes and businesses which have been established in the area surround this large industrial development. Population has increased rapidly in the San Bernardino City area because of increased industrial development. Thousands of people have been drawn into the county by the various Air Force, Army and Marine bases located in the Mojave Desert.

Since 1930 the county has experienced a 256 percent increase in population, compared with a statewide total increase of 153 percent. In 1930, 133,900 persons resided in the county, compared to the 477,000 figure mentioned above. Percentagewise, San Bernardino County ranks third in county growth throughout the State. Orange County and San Diego County rank first and second.

Dr. J. Burton Vasche, Associate Superintendent of Public Instruction, Chief of the Division of State Colleges for the State Department of Education, told the subcommittee that in the 1957 study, conducted by the Liaison Committee of the State Board of Education and the University of California, the San Bernardino-Riverside area was ranked second in terms of need for a state college. The Liaison Committee in 1957 estimated a state college in the San Bernardino-Riverside area would have approximately 11,500 students enrolled by 1970. This would be a larger enrollment than exists at any state college today. One of the reasons the area was deferred in order of preference was to give the Liaison Committee time to study the effect which the establishment of a state college would have on the existing private institutions in the area. Dr. Vasche stated that the rapid development of junior college facilities in the area had temporarily alleviated the problem of higher education for many students. He emphasized, however, that in the future there would be a definite need for a state college.

Dr. Vasche testified that 300 acres of ground would be required for a suitable college for the San Bernardino-Riverside area. He recommended that the State purchase a site in this area as soon as possible, even though actual construction were not started for several years. Dr. Vasche explained that first the Legislature must vote the money for a state college site, and secondly, the site must be approved by the Department of Education. The actual acquisition of a site is then handled through the State Public Works Board.

Tables Nos. 5, 6 and 7 beginning on page 48 were submitted to the subcommittee by the San Bernardino County Planning Commission. These tables graphically illustrate the rapid growth of San Bernardino County. Table No. 5 shows the current county population and estimates for the future. Table No. 6 shows the breakdown among incorporated cities and unincorporated areas of the county. Table No. 7 indicates such growth factors as retail sales, assessed valuation, indebtedness, tax rate, building construction, etc.

At the present time there are 24,444 students in the high schools of San Bernardino County, and 13,927 in the high schools of Riverside County, making a total for the two-county area of 38,371. There are currently some 12,000 students in the junior colleges of the two areas and about 12,000 in the various adult education programs.

The county superintendent of schools and representatives of the various school districts consistently testified to the great need for an additional center of higher education in the two-county area. Representatives of private schools in the area stated they were already overpopulated by high school students who wanted to go to college near their homes. They felt there was a need for a public state college in the area, provided the timing was consistent with the expansion programs of their own private institutions.

The subcommittee concluded that a state college should be established in the San Bernardino-Riverside area in the near future for the following reasons: (1) The rapid growth of population; (2) The large number of high school students presently in the area; and (3) the lack of facilities for public higher education beyond the junior college level.

The subcommittee feels that the necessary arrangements for the purchase of a 300-acre site should be started immediately if a suitable and desirable site area is to be obtained even though the actual construction of a state college need not begin for several years.

SECTION 3

MONTEREY, SANTA CRUZ, SAN BENITO COUNTIES

Because Monterey, Santa Cruz, and San Benito Counties are geographically adjacent, the committee decided to consider them as a single unit in determining the need for a state college in this tricounty area.

Historically, this county has been sparsely populated and has no metropolitan center as such. Growth during the past few years, however, has been phenomenal as it has been throughout the State of California. The population of the counties increased from 211,000 in 1950 to approximately 279,000 in 1958. This is a 31.9 percent increase for the 8-year period.

Several reasons exist for the establishment of a state college in this three-county area. Geographical isolation from any four-year institution of higher learning is an important factor. The area, by virtue of its length and topography, is isolated from any four-year institution of higher education, either public or private. High school graduates must travel long distances in order to attend a four-year college or university. The resulting expense is prohibitive to many high school graduates in pursuing higher educational studies.

A study made in 1955 of five of the six high schools in Monterey County revealed that although 98 graduates were eligible to attend the University of California, only 27 did so. Three hundred fifty-seven graduates were eligible to attend state colleges, but only 19 students actually enrolled in a state college. Four hundred fifty-five high school graduates were eligible to attend state-supported institutions, but only 46 graduates attended such institutions. This study would

tend to indicate that only 10 percent of the students eligible to attend state-supported institutions did so.

A particular need exists for an institution of higher learning where graduates of the two junior colleges in the area could continue their education. No readily accessible college is available to these students where they may take upper-division classes. Students who would like to complete four years of college have difficulty in continuing past the junior college level.

Of grave concern is the fact there is no institution immediately accessible for teachers to secure further educational training. Local school districts are having increasing difficulty in securing professionally qualified teachers because of the isolation of many areas of the counties. Many teachers are appointed in the area on the basis of provisional credentials with the understanding that they will accumulate needed credits. Travel to San Jose State College for evening classes is impossible for most teachers in the area. The demand upon San Jose State College for extension courses in the San Jose area has been extremely large. This has made it impossible for the college to provide the variety and number of courses in the Monterey area needed by provisional teachers in order to acquire a full credential. College classes are also needed for teachers who already have obtained their credentials so they may further their professional work and meet salary schedule requirements.

POPULATION GROWTH

It is always difficult to predict population growth with any degree of accuracy. It is especially difficult in the Monterey-Santa Cruz-San Benito Counties because of the unusual geographic location. Population predictions based on growth over the past decade are likely to be far too conservative. Population is expected to increase in the next decade at a faster pace than it did during the past decade. Among the factors contributing to the rapid population growth in this three-county area are: increased birth rates, influx of people from other states, extension of the more populous south Bay area, the attraction of more and more industry, the development of the deep water harbor at Moss Landing, good climate and attractive living conditions, and the concentration of military centers. Table No. 8 on page 51 shows the comparison of population between the years 1950 and 1958.

The Monterey-Santa Cruz-San Benito County area is a center for activities connected with the creative arts: literature, art, music, and drama. The area's environment is ideally suited to foster the many types of scientific and industrial research now being conducted within its borders. The communities in the area are interested in promoting and furthering programs which improve this cultural background. A state college could utilize the cultural and scientific resources which are available in this area to great advantage by means of art exhibits, theatrical productions, musical performances, and special lectures. A college could be of special value, not only to the students but to the citizens of the area as well. Through its curriculum, the state college can educate the young people in the area for employment in business, industry, government service, and agriculture, thus strengthening the economy in the area and meeting the demand for workers in these fields.

Table No. 9 on page 52 shows a comparison between the number of public high school graduates in the three-county area in 1950-51 and 1956-57. These figures reveal that 1,454 students were graduated from the public high schools of the area in 1950. In 1956-57 some 1,847 students were graduated. This is an increase of 27 percent in only six years. Table No. 10 on page 52 shows the estimated number of high school graduates in a three-county area for the years 1956-57 through 1969-70. The table shows the public high school graduates increasing from the present 1,847 to 3,600 by 1970, or nearly doubling during the next 15 years.

San Jose State College provided the subcommittee with information which revealed that during the fall semester of 1958, 420 students from Monterey, Santa Cruz and San Benito Counties were registered at San Jose State College. Of this total, 206 students were from Monterey County, 21 from San Benito County, and 193 from Santa Cruz County. Table No. 11 on page 52 shows the number of new students from the three-county area registering each year at San Jose State College and other state colleges. The second part of Table No. 11 shows the number of new freshmen from the three-county area entering San Jose State College and other state colleges.

San Jose State College conducts special summer session classes at Hartnell Junior College which gives teachers the opportunity to attend classes during the summer without moving away from their homes. The number of students attending these summer sessions has steadily increased over the past several years. During the summer of 1958, approximately 225 students were enrolled. The vast majority of these 225 were local teachers who were attempting to meet the credential requirements and to further their professional competence.

During the fall semester of 1958, 539 residents of Monterey, Santa Cruz and San Benito Counties were enrolled in the San Jose State College extension program. Records of the University of California Extension Division show that 1,040 residents from this three-county area were enrolled in extension programs under their auspices during 1957-58. The breakdown by type of participation is as follows:

Program	*Enrollment survey*		
	Monterey County	*Santa Cruz County*	*San Benito County*
Classes, discussion groups and law program	317	228	
Conferences	155		
Correspondence	237	88	15
	709	316	15

Some 21 courses were offered in the fields of public administration, education, the humanities, law, liberal arts, and the social sciences.

CONCLUSIONS

Although no major population center exists in the Monterey-Santa Cruz-San Benito County area, it continues to be a rapidly growing area which is geographically isolated from four-year centers of higher education. The subcommittee feels the establishment of a state college in this area cannot be given as great a priority as other metropolitan centers because a sufficient number of students to take advantage of

and fully justify such an institution does not presently exist. However, because of the area's geographical isolation and rapidly increasing population, the subcommittee feels there is a definite need for a state college in the near future.

During its hearings, the subcommittee learned from representatives of the University of California that a site for an additional campus of the university will be chosen shortly and will be located in the San Mateo-Santa Clara-San Benito-Monterey-Santa Cruz five-county area. For the reasons stated above, the subcommittee therefore recommends that continuing studies be made of the Monterey-Santa Cruz-San Benito County area with a view toward the ultimate purchase of a state college site and the establishment of a state college.

PART II

A SEPARATE BOARD FOR THE STATE COLLEGES

Hearings were held on the subject of a separate board for the governing of the state colleges on August 13 and 14, 1958, at Fresno, California. Testimony heard on those dates and background material gathered by the subcommittee staff forms the basis of this part of the report.

This report underscores the problem areas of the state colleges at the present time and outlines the tremendous growth these colleges have undergone in the past 10 years. This growth is indicated in enrollment figures which showed that in 1930 there were less than 6,000 students enrolled in the California State College System. By 1940 this had grown to over 10,000; by 1946, over 16,000; by 1950, some 25,000, and the enrollment during 1958 is approximately 52,000 students. Projected enrollments show that by 1960 over 63,000 students will be enrolled in the state colleges, and by 1965 this will surpass the 100,000 mark.

The subcommittee is of the opinion that the testimony heard at the hearing held in Fresno generally substantiates the need for a separate board to handle the affairs of the state colleges of California.

It is obvious that the growth of the California State College System, the contemplated expansion in the future, in addition to the myriad of problems which have arisen during the past few years, necessitates that a change be made in the method of governing the state colleges. Faculty members and administrators testified that the present State Board of Education has neither the time nor the facilities to adequately govern the rapidly expanding State College System.

A STUDY OF THE FUNCTIONS OF THE VARIOUS BRANCHES OF HIGHER EDUCATION

This subcommittee is recommending that the Assembly Interim Committee on Education be assigned the task of studying the role of the junior colleges, the state colleges, and the University of California as they affect the overall picture of higher education in this State.

Because of the vast growth of these various institutions of higher education and the expenses involved in building new facilities to handle the thousands of additional students each year, some clarification of the functions, responsibilities, and structure of the junior colleges, state colleges and the university is necessary if the best interests of higher education are to be served.

HISTORY OF STATE COLLEGES

The California State College System had its official beginnings nearly a century ago with the founding of the State Normal School in San Francisco in 1862. This was the first publicly-supported institution of higher learning in California and was preceded by the establishment in

1857 of a Weekly Normal School in San Francisco supported by the San Francisco Board of Education. This school was merged in 1862 with the State Normal School.

By 1900, normal schools had been established in Chico, San Diego, and San Jose. The University of California was created in 1868 by the State Legislature and a branch of the State Normal Schools was opened in Los Angeles in 1882, which operated until 1919 when the Southern Branch of the University of California was opened. In 1927 this became the University of California at Los Angeles.

In 1901, California State Polytechnic Institute was established at San Luis Obispo. This opened in 1903 as a state vocational high school, in 1927 raised its level of instruction to that of junior college grade, in 1933 became a two- and three-year technical college, in 1940 was authorized to grant bachelor of science degrees, and in 1949 the master of arts degree.

A college at Santa Barbara was established in 1908, the one at Fresno in 1911, at Humboldt in 1913.

The first California public junior college opened at Fresno in 1910 and the number of junior colleges has grown through the years. Sixty-two junior colleges are now operating throughout California. The California junior colleges were among the first to be established in the nation. Between 1911 and 1915 the junior colleges at Chaffey, Bakersfield, Fullerton, Citrus and Santa Ana were operating. As of October, 1958, approximately 91,426 students were enrolled in junior colleges in the State.

During the past half century the State Legislature, has, from time to time, changed the functions of the state colleges. While prior to 1921 these colleges were known as "normal schools," in 1921 the name and function was changed to that of "teachers colleges." In 1923, the two-year training course for elementary teachers became two and one-half years and the colleges were also authorized for the first time to offer the bachelor's degree. In 1927 the training course for elementary teachers was increased to three years and in 1930, four years, with those pursuing it entitled to the bachelor's degree. In 1935 the name "teachers colleges" was changed to "state colleges" and courses were authorized for students in fields other than teacher education.

In 1947 legislation was passed to broaden the function of the state colleges and additional colleges were established at Long Beach, Sacramento, and Los Angeles. The following year the state colleges were authorized to grant the M.A. degree.

Off-campus centers for some of the state colleges have also been established through the years. In 1938 the Voorhis campus became part of the California State Polytechnic College, and in 1949 the Kellogg ranch also was joined with Cal. Poly. In 1956 Fresno State established an off-campus center at Bakersfield; Los Angeles established a center at Northridge in the San Fernando Valley; and San Francisco established a center at Santa Rosa. In 1957 Long Beach established a campus at Santa Ana.

On July 1, 1958 the off-campus center in the San Fernando Valley became San Fernando Valley State College. Authorization has also been given for the Santa Ana Center to become Orange County State College

and it is expected that in the near future a site will be chosen for a state college in East Alameda County.

In 1930 there were less than 6,000 students enrolled in the California State College System. By 1940 this had grown to over 10,000, by 1946 over 16,000, and by 1950 some 25,000 students. Enrollment during the fall semester of 1958 was 51,983. Projected enrollments show that by 1960 over 63,000 students will be enrolled in state colleges and by 1965 this will surpass the 100,000 mark.

ADMINISTRATIVE HISTORY OF STATE COLLEGES

The first state college was established in San Francisco in 1862. The administration of the school was placed in a board of trustees consisting of the State Board of Education and the Superintendent of Schools of San Francisco, Sacramento and Marysville.

In 1870 the Legislature provided for the transfer of the school from San Francisco to San Jose. In addition, control over the school was placed in a board of trustees consisting of the Governor, the State Superintendent of Public Instruction, and five other members appointed by the Governor.

The second state college, designated the Branch State Normal School of California was established in Los Angeles in 1881. The administration of the school was entrusted to the same board of trustees as that provided for the school at San Jose. Authorization for the establishment of a third college, the Northern Branch State Normal College, was given by the Legislature in 1887. This school also was placed under the control of the same board of trustees.

However, in the year 1887 the Legislature provided for separate boards of trustees for all normal schools, consisting of the Governor, the State Superintendent of Public Instruction, and five members appointed by the Governor. These boards were required to hold joint meetings at least once in each school year and were given power to prescribe uniform textbooks and courses of study.

In 1897 a joint board of normal school trustees was created. This board was composed of the members of the local boards of the several schools. The board was required to fill vacancies in the presidencies of the various schools, to fix the salaries of the presidents, to sit as a board of arbitration in matters concerning the management of each school, to dismiss teachers for cause, to prescribe textbooks, to prescribe a uniform course of study, to prescribe a uniform standard of admission, and to pass general regulations affecting the well-being of the schools. The Superintendent of Public Instruction was named secretary of the board.

The joint board was abolished in 1915. In its place an arrangement was made for a meeting between the State Board of Education and the presidents of the various normal schools to discuss matters pertaining to the schools. The state board was empowered to adopt rules and regulations for the governing of the normal schools much the same as those previouly adopted by the joint board.

In 1921 the names of the normal schools were changed to "state teachers colleges." In that same year, with the establishment of the State Department of Education, the separate boards of trustees were

abolished, and jurisdiction over the state colleges was placed in the new department.

The names of the colleges were again changed in 1935, this time to "state colleges." Administration of the colleges remains in the State Department of Education.

HISTORICAL DATA ON ESTABLISHING A STATE COLLEGE BOARD

The first of a series of legislative recommendations concerning the establishment of a separate board to govern the state colleges was contained in the Report of the Assembly Interim Committee on Governmental Reorganization, June, 1949, commonly known as "The Silliman Report."

This report said, "The administration of the state colleges should be supervised by a State College Board appointed by and subordinate to the State Board of Education with an executive officer appointed by and responsible to the State College Board."

The report went on to say, "The rapid growth and development of the state colleges now presents a number of complicated administrative problems that require more specialized attention and policy decisions than that provided by the existing organization structures and procedures. The appointment of a State College Board by the Board of Education would assure the continuation of the state college system, and would also provide the machinery for more specialized direction of this important phase of higher education. The Board of Education would also be free to devote its time and attention to the important problems of educational policy on the entire public school system of the State."

In 1953, the State College Council, Chairman, Theodore Meriam of Chico, and whose secretary was Roy E. Simpson, said in its report to the Governor and the Legislature: " A State College Board should be appointed by the Governor, and, under the jurisdiction of the State Board of Education, give adequate attention to the responsibilities, the activities, and the development of the State College System."

This recommendation included the suggestion that the board be composed of one representative selected from the local advisory board of each state college; that their terms be for at least five years; that the State Superintendent of Public Instruction serve as executive officer of the board; and that it be responsible to the State Board of Education.

In 1955, a "Restudy of the Needs of California in Higher Education," prepared for the Liaison Committee of the Regents of the University of California and the California State Board of Education, was published. This report, commonly known as "The Restudy" or "McConnell Report," was also staffed by T. C. Holy of the University of California and H. H. Semans of the State Department of Education.

The restudy recommended, "That within the Public School System a new nine-member lay board for the government of the state colleges, co-ordinate in the structure of the State Government with the State Board of Education, be created. The State Superintendent of Public Instruction should be an exofficio member. The other eight members

should be appointed by the Governor and confirmed by the Senate for terms of four years, with no more than two appointments expiring each year."

This report also said, "The State Board of Education has not in the past and, if it maintains the wide range of supervisory and governing powers it now has, probably will not in the future, be able to give sufficient time to planning and policy formulation for the state colleges, sincerely as it may wish to do so.

"The Superintendent of Public Instruction, whose administrative duties cover even a greater range of activities than the State Board of Education, consequently finds it difficult, if not impossible to give sufficient day-by-day attention to the state colleges.

"More aggresive overall leadership and more efficient central administration are needed if the state colleges are to be operated as a system and the individual institutions are to conduct their own programs in relation to general educational policy for the colleges.

"Difficulties in the administration of the colleges by the division are the result of inadequacies in: definition of line functions and responsibilities; definition of staff functions and responsibilities; co-ordination of staff and line personnel; decisiveness in dealing with policy questions and administrative matters; aggressive presentation of state-college matters to other state agencies; provision of sufficient staff for review of curriculums, and for research.

"Insufficient central planning and inadequate provision for distributing educational programs among the colleges have led to the following costly practices: Specialized programs have developed in geographical areas, where, in relation to other institutions, they may not be needed; too many curriculums in a given field have been approved beyond the needs of the State as a whole; too many very costly curriculums, which should have been confined to a few colleges, have been authorized; proliferation of courses in certain fields beyond the functions of the colleges or beyond sound educational principles has occurred; new curriculums have been, in effect, created by increasing course offerings without prior approval of curriculums as such; colleges in some instances have not maintained the distinctive functions for which they should be responsible; the colleges have not been adequately conceived and conducted as a system.

"The Council of State College Presidents should be commended for its advisory aid in handling administrative details for the colleges. It has been less successful in fulfilling policy making and executive functions which in fact are not its primary responsibility. By its very nature, it has not succeeded in reaching agreement on the functions of the individual colleges and on the central planning and administration necessary to build the colleges into an educational system."

THE FRESNO HEARINGS OF AUGUST 13 AND 14, 1958

The hearings of the Subcommittee on Higher Education, held in Fresno on August 13th and 14th, were conducted by its chairman, Assemblyman Harold T. Sedgwick of Oroville. Representatives from all state colleges in California were present at these hearings. Testimony was also heard from faculty representatives from each of the state colleges. Also testifying before the subcommittee was Superintendent of Public Instruction, Roy E. Simpson, and several members of the State Board of Education. In order to best illustrate the various ideas and opinions expressed at the hearings, the following excerpts of testimony from some of the witnesses are presented. While these excerpts have, in some cases, been edited for the sake of clarity and conciseness, the opinions of the witnesses have not been altered.

Theodore Meriam, Chairman, Local Advisory Board, Chico State College

(Mr. Meriam served as chairman in 1952-53 of the State College Council created by the 1951 Legislature. The council was charged with the responsibility of studying the need for the establishment of an advisory council or similar agency for all state colleges and to study and make recommendations for the improvement, organization, and administration of the state colleges. Mr. Meriam gave the following history of this State College Council and its recommendations):

The State College Council existed from early 1952 through June 30, 1953, at which time it ceased to exist in accordance with the statute which had created it. The council consisted of a representative from the local advisory board of each of the state colleges, a member of the Board of Governors of the Maritime Academy, a representative nominated by the President of the California State Polytechnic College, and the State Director of Education. There were 12 members in all. Seven meetings were held and, after much consideration and discussion, a report was submitted to the Governor and the Legislature on March 1, 1953. This report contained four primary recommendations, one of which was as follows:

> "A State College Board should be appointed by the Governor, and under the Jurisdiction of the State Board of Education give adequate attention to the responsibilities, the activities, and the development of the state college system."

There was not full agreement among the members of the State College Council on this recommendation. Some felt that such a board, actually subordinate to the State Board of Education, would be impractical and unworkable from an organizational viewpoint. There was also strong difference of opinion as to the value of any advisory-type board.

However, the members of the council all agreed that the state colleges should be retained in the public schools system of California under the authority of the State Board of Education, and that there should be some means of providing greater attention to the needs and development of the state colleges by an appropriate non-professional, policy-creating group, whether it be the State Board of Education or a separate State College Board.

Bills were introduced in the 1953 Session of the Legislature to make effective the several recommendations of the State College Council and to create the State College Board. Most of them were successfully killed by representatives of the State Department of Education. The bill to create the State College Board was vigorously challenged by the Associate Superintendent of Public Instruction in charge of state colleges. Although the bill was referred to the Assembly Ways and Means Committee by the Assembly Education Committee, it died peacefully in the Ways and Means Committee by being taken under advisement.

Now, let me represent the Local Advisory Board of Chico State College. Our board members have discussed the proposal for a separate governing board on several occasions. Our feeling, generally, has been that we favor strengthening the State Board of Education in order that greater attention may be given to state college matters and that the state colleges be retained in the present public schools system of our State. We are in accord with the plan announced by Roy E. Simpson on July 18th which contemplates a much stronger State Board of Education and which gives to the State Board of Education comparable authority over the state colleges to that which the Board of Regents exercises over the University of California.

We further feel some sort of direct tie between the State Board of Education and the local advisory boards of the several colleges should be provided. Perhaps the State Board of Education should meet once or twice a year with the chairman of the local advisory boards or a representative from the local advisory board of each college, in order to have a greater understanding of the needs of each of the state colleges. Such meetings would provide to each college the opportunity for an official, but non-professional, "voice" before the governing Board of the state colleges.

Question by Assemblyman Hanna: I want to refer to your statement, Mr. Meriam, that "We feel state colleges should be retained in the present public schools system of our State." What conclusions motivated that particular statement?

Mr. Meriam: I think I can best answer it this way: we discussed the matter of separation of the state colleges from the State Board of Education at great length during our State College Council days. We felt that if a separate board, entirely separate from the State Board of Education, were established, then, possibly, the next step would be something similar for the junior colleges, even though they were partly locally supported. It could provide a trend toward separate sections of our educational pattern in California.

We regard the university, under its Board of Regents, as being separate from what we considered to be the school system in this State. We felt then that the state colleges, providing the only real higher education in our system, should be part of the system. There would be a value from being able to co-ordinate and plan the total program of education in the State, from kindergarten through the fifth year of state college work.

Lyman A. Glenny, Former Staff Member, Restudy for the Need of Higher Education in California

I am appearing as a former staff member of the "Restudy for the Need of Higher Education in California." I worked as a consultant on that study and prepared all of the internal staff studies in relation to the state colleges. I wrote the section now contained in the "Restudy on State College Administration," and also, the liaison between the University of California and the state colleges.

Since the completion of the restudy, I have conducted a two-year nationwide study of state governing boards for higher education. The study was financed by funds from the Carnegie Corporation through the Center for the Study of Higher Education at Berkeley. In addition, I have been a paid consultant on the Organization of Higher Education for the State Governments of Texas, Tennessee, Montana, Utah, and to the Western Inter-government Commission on Higher Education.

In my research and conversations with several hundred persons, including university presidents, legislators, governors, state budget officers and state administrators of higher education across the country, I have reached the following conclusions on the governing of a state college system.

1. The relationships of students to the college, of faculty to the administration, and of college administration to the state governmental agencies and the State Legislature, are so different from the same relationships in the Public School System, that the effective handling of colleges and universities by the same board is inadvisable.

2. A separate board for colleges and/or universities in a state is essential to a quality system of higher education. In not a single system in the United States where the state board controls both the public schools and the colleges, have the colleges developed reputations for scholarship and teaching effectiveness.

3. In order to preserve the quality, integrity, flexibility, and autonomy of higher education, a superior type of leadership must be devoted exclusively to the interests of higher education.

4. As such leadership is exercised for the higher educational system, the system itself gains the confidence of the legislature and of the state executive staff agencies.

5. As confidence is gained through the imaginative leadership and efficient operation of the system, the state government agencies and the legislature allow greater autonomy and flexibility to the institutions in the system.

6. Contrary to this, where confidence and leadership is lacking, executive or legislative agencies will attempt to fill the vacuum created by weak leadership and inefficiency. Consequently, a great many educational decisions are made by these agencies that would, under other circumstances be left to the system of the institutions and to their governing board.

Based on these general observations more specific conclusions can be made about the California State College System.

1. The California State College System has more students and more colleges than any other college system in the country and may be surpassed only by two large universities in the total number of students.

In other words, the California State College System may be the greatest educational empire in the country. And it is still growing.

2. Many of the colleges in the system are larger than the average size university and have programs almost as complex and broad in scope.

3. Institutions of this size and complexity in the rest of the country usually have a separate board for each institution, or a single board for a group of them, or, perhaps, both in some states. The recent trend is for a state to put all of the institutions of higher education under a single board.

4. The State Board of Education has not, in the past, and is not now devoting nearly enough time to policy making for the college system.

5. In most states, boards for higher education meet 12 times each year, very frequently for periods of two or three days. In addition, boards for each of the institutions may meet for a similar amount of time. The Regents of the University of California met 28 times in the last two years and its financial committee met 71 times during that two-year period. The State Board of Education in that same time, met exactly eight times for all of the education in the State of California below the university system. The board spent only two of those eight meetings on college matters in two years. Since the restudy, the state board has increased its state meetings per year to six, and one time seven, but at present, less than one week each year is devoted to any kind of state college matter. A total time of one week. One week for the government and supervision of a college system of 10 institutions and 52,000 students is far too little.

The United States Office of Education, in a survey of education in the United States in 1955, had the following to say about boards which controlled both the public schools and the colleges. This type of arrangement "may multiply the work of board members not only twice but many times. It may divert the attention of board members from broad versions of policy and from the colleges to operating details for a single institution. It may involve so much work that board members are unable to devote the necessary time to educational affairs. In short, there is the danger that state boards of education may become so overloaded with operating responsibilities, that they are unable suitably to carry out their policy determining duties."

In California the executive officer for the State Board of Education, which governs the State College System and supervises all public elementary, secondary and junior college education in the State, is the elected Superintendent of Public Instruction. This legal arrangement is related to several weaknesses in the co-ordination of the colleges. First, neither the superintendent nor the state board gives sufficient time to the government and co-ordination of the state colleges. They cannot do so and still provide effective supervision of the Public School System in a state the size of California. As it is, the College System is technically governed by the division of the state colleges in the Department of Education.

Second, the superintendent, because his position is political, has been unable to provide the professional leadership necessary for the colleges. The Chief of the Division of State Colleges, rather than the superintendent, actually performs the executive role for the college system, but,

because of the political arrangement involved, this office cannot provide strong leadership.

Third, the board of education has no control over its own executive officer (as a superintendent) nor over the division of the state colleges. This diffusion of power has led to confusion of responsibility and weak leadership.

Lastly, the above deficiencies have not only allowed but encouraged, the executive agencies of the State, particularly the Department of Finance, to assume the real control over the college system.

Roy E. Simpson, Superintendent of Public Instruction

I made a proposal after I met with the state college presidents at a regular meeting in Sacramento, that we suggest there be a constitutional amendment made giving the State of California a pattern of administration for public education which would improve the kind of structure we now have. (A copy of the proposed constitutional amendment appears as Appendix No. 11 on page 53). Serious consideration must, of necessity, be given to the power given to any board for this is basic to the success of any program.

This proposal, which has been agreed to by the presidents and which has been discussed by the board this morning provides for the appointment of a board of 11 persons, their terms so arranged that no one administration could exercise too much, if any, serious political control over the public schools of California.

I would, therefore, suggest that a board be given the full power to select and appoint the Superintendent of Public Instruction, fix his term of office and also fix his salary. One of the difficulties we face at the present time in the operation of our state colleges is due to the fact we are hedged in by other departments of state. We have been very fortunate in securing fairly good co-operation between those other departments of state. They have a job to perform and we recognize it. The time has arrived, however, when we need to view this problem in a larger way. I think, in addition to the appointment of the superintendent, the State Board of Education should be given the authority to also select the person to operate the state colleges and to provide him with adequate staff to do that.

That is the proposal which I make to you today. I have covered it in a general statement. Our release to the press on July 18th is perhaps a little more comprehensive statement than I gave to you, but you have it before you and you are perfectly competent, I am sure, to analyze it and ask questions, as I would expect you to do.

Questions by Assemblyman Doyle:

Q. Mr. Simpson, you mentioned that the material contained in your proposal was taken up with the state college presidents, who approved this action. Did they approve, or did they agree?

Mr. Simpson: They voted unanimously.

Q. Was the staff of any of the state colleges apprised of what was going on or asked to appear before you or before the board in discussing this problem before today?

Mr. Simpson: I operate through the presidents and through them to their faculties and representatives. I felt no need for conferring with the faculties of the colleges. That responsibility is placed with the presidents.

Q. In your opinion, to what extent, if any, would your proposal diminish the fiscal powers and responsibilities of a Governor?

Mr. Simpson: I don't think it would limit his powers at all. He would be the appointive power of the board with two-thirds confirmation of the Senate.

Q. How would this proposal work between the Department of Education and the Department of Finance? What type of controls will there be on the superintendent or the board? What controls would the Legislature or the Department of Finance or the people of California have over this particular recommendation?

Mr. Simpson: Just the same as they have over the regents of the University of California.

Q. Am I correct in assuming that since you have gone to some trouble and considerable planning and work to present this constitutional amendment, that this is an indication on your part that you feel the present operation is less than what we should be doing?

Mr. Simpson: I attempted to say at the outset that the time had arrived for us to improve that which we now have. I think we can be much more effective with this pattern. We have done a very superior piece of work under some very trying circumstances.

Q. I think we can agree with that. Would you delineate for me a few of the specific weaknesses which we now have that you feel this proposal will strengthen?

Mr. Simpson: I would have to enumerate many of the duties now placed with the regents of the university. This would, in general, with the consent of the Legislature appropriating X dollars, give to that board the opportunity to expend those dollars as, in their judgment, it seemed wise to do. The regents of the university do that now.

Questions by Assemblyman Collier:

Q. Mr. Simpson, you, as the Director of Education, are the Executive Officer of the Board of Education, are you not?

Mr. Simpson: That is correct.

Q. The Board of Education actually makes the policies, so far as education, for the state colleges and for secondary and elementary schools. Is that right?

Mr. Simpson: That is right. We have some division of responsibility. Under my administration, the board has made the policy.

Q. But, in the final analysis, the policies are made by the board?

Mr. Simpson: That is under the law.

Q. In your constitutional amendment, in which you propose to give yourself the same privileges the regents of the university have today, actually, you are extending your privileges farther than the university because you are including that the board shall have supervision of, and control over, all other components of the Public School System. So, actually, you are asking for more, in your request, than is granted to the University of California today, because they only control the university and its branches.

Mr. Simpson: Well, in that sense, of course, the present board has policy-making authority within the limitations imposed on it by the State Legislature. Our attorneys struggled with the wording. The ideas we are trying to convey are the things for which we are struggling. If that language turns out, in the opinion of our attorneys, to place upon this proposed board some responsibilities now located in local school districts, we would have to make that modification.

William L. Blair, Chairman, California State Board of Education

The board, this morning, discussed in some detail the proposal which Mr. Simpson has presented to you. The board members unanimously agreed, in principle, with Mr. Simpson's proposal, although a number of questions and points still remain unsettled. We believe any amendment to the Constitution cannot pass without being considered for a considerable period of time and probably clarified in minor ways. What the board has done is to endorse the proposal in principle.

It would certainly be advantageous to the state colleges to continue to be considered as part of the public education system in the State. In the vocational fields, they are quite different from the University and quite similar to the junior colleges, although they carry vocational training to a much higher level than is possible in a junior college.

The state colleges, I believe, are a part of the public school system and should continue to be a part. I think that is the strongest argument against a separate State College Board.

Wilbur D. Simons, Member, California State Board of Education

Soon after coming on the board I felt we were handicapped in some of the things we could do. After talking at great length to different members of the board we came up with a proposal similar to that which Mr. Simpson has placed before you. For about the last 3½ or 4 years, the board has been devoting a great deal of time to the state colleges. I believe the state colleges are doing a better job now because of that.

Mrs. Eva C. Noland, Member, California State Board of Education

I am a fairly new member of the board. I was appointed only two years ago. I think we have been an effective board, but I think we could be even more effective if we had the power of a board. By that I mean the ability to make educational policy without having the policy modified by other agencies. I would suggest that the board be an overall Board of Public Education. I think it must have fiscal and personnel control.

William G. Werner, Member, California State Board of Education

I feel there is no need for a separate board. In fact, I feel it would work to the detriment of the school system of California. It would be far better if we had one board control education in its entirety, but, that not being possible, I would like to see the board retain these recommendations. There might be a question in your mind whether the salaries should be fixed by the Superintendent of Instruction. That is a question I feel the Legislature could satisfy by itself. I feel the board should recommend, but I believe there should be a check system.

Mrs. Seymour Mathiesen, Member, California State Board of Education

I am a brand new member to the board. I am for a separate board. I have been for a separate board for a good 10 years. I can see, too, as a taxpayer, I wouldn't want to have a separate board, but I feel too keenly that the state colleges are big business in California. I think that state money spent at the top can certainly save millions of dollars in the long run as it trickles down.

I don't think the University of California has the corner on higher education and I am definitely for the state colleges. I feel if a state board for the state colleges is created, it should have the right to control salaries. If you are going to hire personnel you should be able to pay them. If we are going to have an agency that is responsible to the taxpayers for a job well done.

Raymond J. Daba, Member, California State Board of Education

I am a new member of the State Board of Education and I have had the benefit and experience of only a few meetings. I have also had no experience in the field of education. I am approaching it strictly from the layman standpoint as the father of schoolchildren and getting the best education possible for my tax dollar. As I understand it, the issue before this subcommittee is whether we should set up a college board, separate and distinct from the State Board of Education. You have already heard and are acquainted with the proposal of Mr. Simpson to expand the State Board of Education so it may effectively operate in California. Insofar as this proposal goes I am inclined to support it completely. My personal observation is that public education, from kindergarten to the termination of college, should generally be governed by one group who can integrate the policy so our children take advantage of it all the way from the beginning to the end of their formal schooling.

My current lay observation is that there is a constant skirmish going on between the State Board of Education and the Regents of the University of California. It seems to me that any study made by this subcommittee should include the establishment of one board to control the destiny, not only of the state colleges, but also the university and the basic policies in the high schools and grade schools as are presently under the jurisdiction of the state board.

William N. Bucknam, Member, California State Board of Education

One of the restrictions on the present board is the fact that this board has no personnel. It can institute no study; it has no methods to examine what is going on in public education in California except through the office of the Superintendent of Public Instruction. We need an inspecting agency, either under the powers of the board or an independent agency. We need the staff; we need the plan; and when we have the plan we need some powers to go with it.

Arnold E. Joyal, President, Fresno State College

The presidents of the state colleges unanimously support the proposal which was developed co-operatively between themselves, Mr. Simpson and his associates in the State Department of Education. This proposal was first discussed on July 14th. Immediately prior to the last presi-

dent's meeting, a group of us met informally, without direction from Mr. Simpson, and tried to develop a specific plan to bring before this committee on this subject.

I have been President of Fresno State College for 10 years. Ever since I have been there, this question has been under discussion; those of us who are principally concerned with the administration of these institutions have given a lot of time and attention to the problem. We have discussed this issue in one form or another, and we have talked over a great many possible plans. Within the institutions, too, our faculties have discussed these issues. Yesterday, I met with representatives of the various colleges, and representatives of the California State Employees Association. We exchanged points of view with respect to this particular proposal.

Neither in the frequent discussions which we have in the institutions, nor in yesterday's meeting, is there complete unanimity of opinion with respect to what is the best proposal. You wouldn't expect it any more than a complete agreement in the Legislature. However, there has been a change in point of view. There is now general agreement that we need some different type of board; some board which has more autonomy to do the things which need to be done. Although there is no unanimity of agreement as to just how the board shall be constituted, this specific proposal, was formulated so far as basic ideas are concerned by the presidents. We asked Mr. Simpson, whom we knew to be interested in the idea, to sit down with us, talked it over informally and then we came to an agreement. This was not something that could have been or was imposed upon us.

Arthur J. Misner, Representative, Association of California State College Instructors, and President, Los Angeles State College Chapter of the California Employees' Association

The Association of California State College Instructors feels a basic reorganization is necessary and after careful study is prepared to make the following recommendations:

1. To amend Article IX, Section 6, of the Constitution of the State of California, by deleting in the second paragraph, the first sentence, the words "and state colleges" and deleting from the same article, section and paragraph, in the second sentence, the words "or college."
2. To support in Article IX a new Section 16, which would read approximately as follows: "There is hereby established a system of California state colleges. The State Legislature shall pass such laws as may be necessary to carry into effect the program of higher education assigned to the state colleges."

To give an even clearer picture of the position taken by the faculties of the state colleges, I should like to present a "statement of objectives for the State College System," which was developed and adopted jointly by the Association of California State College Instructors and the California State Employees' Association:

1. The administration and operation of the state colleges should be entirely separate from the secondary and elementary school systems.

2. The administration and operation of the State College System should be separated completely from the State Department of Education, the Superintendent of Public Instruction, and the State Board of Education.
3. This should be accomplished by a Constitutional Amendment.
4. A separate lay board for the State College System, appointed by the Governor, should be established. The board's primary function should be the development of general educational policies for the state colleges. The board should not become involved in the ordinary processes of administration.
5. The State College Board should appoint a Chief Administrative Officer, whose qualifications should include teaching and administrative experience in a major institution of higher education.
6. In establishing the agency to administer the state colleges, recognition should be given to the regional nature of the program. Each state college should be enabled to develop educational programs to meet the requirements of the region served by the college, and it should be given as much local autonomy as is compatible with the general policies established by the State.

We are suggesting the divorce of the State College System from the Public School system for a number of reasons. The changing role of the state colleges since 1935 which indicates teacher-training is no longer the singular function of these institutions. This is not to imply that the Association of California State College Instructors does not recognize the importance of teacher-training in the colleges, but represents a conclusion that this function is only one of many important services to be provided by the state colleges.

Turning to the inadequacies of the present system, we should like to present several outstanding instances in which the state colleges, and thereby the people of the State of California, are "short-changed" in the direction and control of higher education.

First, there seems to be overwhelming evidence to indicate that the State Board of Education has such a wide range of responsibilities that it is unable to give sufficient and proper attention to the operation of the state colleges.

The McConnell Report points out very clearly that the state colleges do not receive sufficient attention at the board meetings at the present time. The Association of California State College Instructors have done additional research since the publication of the McConnell Report by going through the minutes of the board. The State Board of Education devoted, in the period from January, 1956, to September, 1957, approximately 48 hours total time to the problems of the state colleges.

As the McConnell Report has so aptly illustrated, the Board of Regents give approximately 20 times as much effort to the problems of the University of California.

Because the State Board of Education is unable to devote sufficient attention to the state colleges, the policy in administrative problems devolve on the Department of Education. Therefore, the ACSCI has concerned itself with the basic attitudes, philosophy, orientation of the officials of the Department of Education and the resulting administrative framework, which has been developed for the operation of the state college program.

A fundamental tenet of good administration is:

"A supervisor should be as competent in his field as the people he supervises." Investigation by the ACSCI indicates this is hardly the situation in the State College System.

At the local level, the academic staffs of the several colleges are supervised by individuals selected by the Department of Education, who, for the most part, are trained and philosophically oriented towards the elementary and secondary level of education, which leaves grave deficiencies in the academic disciplines. At the state level, the colleges are supervised by a Division of State Colleges and Teacher Education staffed almost exclusively by individuals trained in and with experience only in the area of elementary and secondary education.

It is well known that research is an integral part of any higher educational program, both in the institutional objectives and in the maintenance of the competence of the academic staff. Until very recently, research was not only discouraged but almost prohibited by the philosophy and regulations of the Department of Education.

After considerable pressure by the faculties, and in some instances by local administrators, a new policy was adopted, permitting 1 percent of the total professional time on the campus to be allocated to research. This is, of course, entirely inadequate and fails to realize the following conditions:

a. Research is necessary to keep students and professors abreast of the subject. The real vitality of teaching stems from the professor's opportunity to bring to his students the current developments in the field. This can only result when opportunity is given to spend time on research of the work of others and on matters of original interest to the professor.

b. Institutions which do not permit research find it difficult to recruit well-trained college professors who desire to live in an intellectually inspiring environment.

c. The lack of opportunity to do research at the colleges has deprived and will continue to deprive the people of the State of California of the fruits of such intellectual activity. In these perilous times, when national and international attention is focused on the need to "find the answers" to both physical and social questions, the philosophical orientation of the State Department of Education in opposition to research can only be described as imprudent.

G. A. McCallum, Professor, San Jose State College

I have been a member of the State College Committee of the California State Employees Association for the past 10 years. We have studied this problem as long as I can remember and in the last three years have put in a number of hours of very serious consideration on it.

During all of our deliberations, we have always invited a member of the State Department of Education staff to meet with us and at least one member of the staff has always been present at our meetings. We felt it proper that the Department of Education should be informed as to our thinking. We have not made any attempt to hide what we have been doing and our thoughts.

Our recommendations are as follows:

The administration and operation of the state college system should be entirely separate from the secondary and elementary systems. The administration and operation of the state college system should be separated completely from the State Department of Education, the State Superintendent of Public Instruction and the State Board of Education.

We are recommending the establishment of a separate lay board, whose primary function shall be to develop the general education policies for the state colleges, and not become involved in ordinary processes of administration. We are recommending that a chief administrative officer, whose qualifications should include teaching and administrative experience in a major institution of higher learning, be appointed.

We also recommend that each state college be enabled to develop educational programs to meet the requirements of the region served by that college and should be given as much local autonomy as is compatible with the general policies which are established.

Dean Cresap, Professor, San Jose State College

I wish to summarize what seems to me to be at least three areas of friction between the State Department of Education and the state college faculty.

One stems from the differences in theories of education. As we all know, the elementary and secondary schools are required to take care of a great variety of youngsters: the bright, the dull, the average, and those who hunger for learning, and those who are forced to attend school.

Under such circumstances, the tradition of the educated man sets a standard of achievement for all students, which, for many, seems to be impossible. As a result, during the last 30 years, there has been a shift of emphasis in the lower public schools away from intellectual achievement and towards other aspects of "child development." For example, there has been a greater emphasis on developing manual training and manual arts. There are also paper drives, pep rallies and other forms of entertainment. A philosophy of education has been developed to justify these activities.

College education, however, is another matter. Young men and women are not required to attend college. Those who do attend must measure up to standards of performance and those who graduate represent a rather high level of intelligence. Colleges serve a somewhat select group and the colleges are still interested, primarily, in intellectual achievement and the preservation of and the search for knowledge.

Even in the field of occupational training, the colleges try to limit their efforts to only those fields which require a somewhat vigorous and intense preparation. As a result, theories of education that might be right for the lower public schools are bitterly resented by college faculties when applied to colleges.

Nevertheless, personnel within the State Department of Education are recruited, for the most part, from the elementary and secondary school systems and from school departments of teacher-training. Quite naturally, these teachers bring with them to the department, the ele-

mentary and secondary school attitudes. As long as they are expected to supervise the colleges, I am afraid we can expect nothing but the present antagonism.

A second cause of friction has to do with academic background. One of the distinguishing characteristics of elementary and secondary school administrators, nowadays, is that nearly all of them hold graduate degrees in the field of education or teacher-training.

The education code, of course, contributes to this situation. One must have taken numerous courses in education in order to qualify for an administrative position.

The typical college or university administration staff is considerably different. One usually finds a great variety of instructional departments represented among the presidents and deans.

A recent study has noted the frequency with which the field of education is represented in academic degrees among college presidents, vice presidents, and deans.

Whether the exclusive control by one group is important in influencing the character of the state colleges, I don't know. But I do know that members of the faculties of the various campuses have expressed resentment regarding this situation. Since the Department of Education is staffed by School of Education people, the control of the administrative appointments remains in the State Department of Education. There is little chance of an appreciable change.

A third cause of friction between the Department of Education and the state college faculties results from differences in theories of administration, particularly as to the policy-making aspects of administration.

The responsibilities of the faculties in the policy-making process are ill-defined. However, it is the general impression that the Department of Education takes an unfavorable view of the development of policy, either local or statewide, in co-operation with the college faculties.

A college is a unique institution. It is not like a military establishment, nor is it like most business corporations. Faculty members are not disinterested workers on an assembly line. On the contrary, a faculty is a community of scholars intensely interested in the product of their joint efforts. Their individual professional reputations depend, in large measure, on the respectability of the colleges in which they work. They have a very acute interest in college policy, and traditionally, college faculties have played a large role in the determination of such policy.

Ross Y. Koen, Professor, Humboldt State College

The Humboldt State College Chapter of the Association of California State College Instructors held a meeting recently in which they discussed whether or not the faculty wanted to go on record in favor of a separate state college board. Two-thirds of the members of the organization were present and the vote in favor of a separate state college board was unanimous.

I think the state college presidents as a group believe the fundamental necessity at the present time is to gain autonomy for the state colleges from the Department of Finance, the Personnel Division, the Legislative Analyst, etc. The faculty believes it is fundamental at the present time for state colleges to gain autonomy from the State De-

partment of Education and to secure a separate governing board composed of people acquainted with and sympathetic to higher education. The faculty believes such a board should also be independent of the Departments of Finance and Personnel, and the Legislative Analyst. A strong board can work with these agencies, rather than presenting a situation in which there is constant conflict between them.

Dr. N. Field Winn, Professor, Chico State College

Our faculty organization at Chico State College voted unanimously in favor of the principle of a separate board. The present organization of education in California appears to regard the elementary, secondary and state college system as a kind of continuum in which all too frequently the first year of college becomes simply the fifth year of high school.

During the past several years, the character of the state college faculties has changed a great deal. At Chico, especially, we have been hiring vigorous and intelligent young men, whose training, orientation and interests, particularly in scholarship and research, do not predispose them to stay in a system which limits their activities and offers them insufficient outlets for their talents. I have seen some of these men lost to the State of California and I firmly believe we shall lose more of them.

I think the training of teachers is an extremely important function of the state colleges. It is not to be minimized, but it is certainly no longer the only function.

I don't wish to disparage the efforts and activities of the present board, but I believe I can speak for my organization when I say that any board which must be concerned primarily with the public schools is not likely to have either the time nor the philosophical orientation necessary to the continued growth and well-being of the state colleges in California.

Victor L. Jepsen, Professor, Fresno State College

The divorcement from the State Department of Education is necessary in order to obtain a type of leadership the state colleges need to face the great educational problems of the future.

I think one of our greatest problems is how to effectively spend the necessarily limited amount of money available for the education of the great mass of students we are going to have. What curriculums are most important? What type of student is most important to take advantage of the necessarily limited money?

A second problem is going to be attracting competent faculty members. It is already a bad problem.

A third problem, I think, is to be able to convince the State we need more money.

In order to tackle these problems most effectively, I think we need leadership of a high order. Leaders who are oriented to the philosophy of higher education. Leaders who are expert in utilizing the resources of a body of scholars in order to effect the most efficient and the best policies for higher education in California.

Dr. Leo McClatchy, Professor, San Francisco State College

At San Francisco State we have excellent faculty-administrative relationships with a great deal of faculty participation in the setting of policy. This is especially true with our new president. In fact, this fall we are setting up, for the first time, a faculty council with elected faculty representatives, who will work with the president. I know there will be a great deal of co-operation. I also realize this is not true at all of the other colleges.

The faculty also knows that at the state level there has been a definite lack of leadership. We feel we are suffering from it. Certainly something must be done to give us more effective leadership at the state level.

Dr. Leonard Cain, Professor, Sacramento State College

My own thinking is rather directly contrary to that represented in Mr. Simpson's proposal and also that represented by the state college presidents.

It is not a matter of a long-range goal. Certainly, the faculties and the administrations of the state colleges have the improvement of the instruction as the goal. I think it is primarily a matter of priority.

The main problem is primarily a physical matter. If we can become unshackled from the other administrative agencies, then, we will have freedom; we can have authority; we can assert power, and therefore, approval.

Rather than the basic issue being that of physical severance, it is one of philosophical severance. I suggest it is primarily the task of higher education to interpret and contribute to knowledge, which, I gather, is the primary function of the elementary and secondary systems.

Interpreting and contributing creatively to our heritage is a distinct task; a task which requires special consideration of a board that will develop and defend policy quite distinct from that now in evidence in our state level administration.

The first priority should be given to this philosophical severance. It is my hope that through the assertion of leadership of the state colleges, we will attain autonomy, whether a structural autonomy or an operational autonomy. Then we will be able to show new leadership through the accomplishment we deserve.

Dr. George Appleton, Long Beach State College

We have in the administration of Long Beach State College a philosophy of education which is primarily a public school philosophy. I don't disparage it; it has its illustrious history. I think it has failed in a lot of respects today. We think the separation of a state board will immediately help to solve this problem, because we will be divorced from the State Department of Education. We will have cut the umbilical cord that ties us to our formal school past.

The faculty of many shools will then be unleashed and will be able to debate and discuss on equality, not spout about the administration. Through this work, the new philosophy of education can be developed to meet the needs, not only of the state colleges of California, but also to help in terms of public higher education elsewhere.

Assemblyman Richard Hanna, Westminster

I have been very impressed at this hearing with indications that we need a fresh expression of the philosophy of higher education. We should reflect what we have become, rather than what we once were.

We inevitably, in effecting change, do not leave behind all the devils that we know and inescapably we meet devils whose acquaintances we have so far happily escaped. We can expect, no matter what changes we make, that some of the particular problems which have been enunciated here today will reappear in new form in any organization. The answers suggested to their solution will, in another time and another place, take another form.

All of us must realize in living in a changing world that we never come to a complete solution of any of our problems, but I hope that in answering this problem in the field of education, all of us will keep in focus the great opportunity we have through education. We must remember the responsibility we have to raise the dignity of everybody involved in education, from the humble kindergarten school teacher to the highest professorial ranks in our colleges and universities.

So long as we do these things, and do them in a framework of philosophy which we all understand, and, to at least a great degree, accept, we will resolve our differences and do the finest possible job for the State of California.

APPENDIX I

TABLE NO. 1

Office of the County Superintendent of Schools

ACTIVE ENROLLMENT FOR GRADES KINDERGARTEN THROUGH 12TH IN SAN MATEO COUNTY SCHOOLS
AS OF OCTOBER 31, 1957

School district	K		1		2		3		4		5		6		7		8		Ungraded		Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Elementary:																						
Bayshore	38	50	49	44	24	30	40	30	40	32	31	29	31	29	29	24	14	20			296	288
Belmont	189	164	160	123	155	123	148	135	102	121	139	100	109	113	86	76	85	75	3	2	1,176	1,032
Brisbane	25	34	38	21	34	34	43	27	35	29	28	22	27	27	22	22	22	23			274	239
Burlingame	105	103	138	132	142	123	152	129	145	154	138	140	162	156	140	137	128	140	17	17	1,267	1,231
Coastside Union	47	30	35	28	35	38	29	40	31	39	29	28	23	29	29	24	35	30			293	286
Hillsborough	44	59	65	65	53	69	73	71	69	50	54	64	61	64	53	59	58	42			530	543
Jefferson	475	516	382	384	385	326	369	322	321	335	292	299	296	256	244	192	190	192	24	12	2,978	2,834
Laguna Salada Union	316	298	313	282	276	259	260	235	215	218	205	188	207	211	143	128	120	93	4	8	2,059	1,920
La Honda	5	15	6	8	15	9	3	7	8	5	5	11	12	6	8	6	13	7			75	74
Las Lomitas	89	75	66	59	69	63	62	58	72	62	71	65	61	52	53	47	49	44			592	525
Menlo Park City	164	141	123	130	120	112	137	137	155	130	145	116	133	151	141	141	138	105			1,256	1,163
Millbrae	189	217	171	163	175	149	161	167	166	156	177	140	166	182	133	105	108	116			1,446	1,395
Montara	4	12	13	6	7	8	7	10	8	10	8	5	7	9	4	10	9	10			67	80
Pescadero			7	10	6	10	10	6	9	6	8	12	5	3	4	7	10	2			59	56
Portola Valley	36	29	29	32	32	22	31	24	26	25	31	32	24	20	25	22	23	21			257	227
Ravenswood City	355	349	377	339	308	297	365	273	298	305	274	287	237	224	205	196	193	197	11	19	2,623	2,486
Redwood City	730	704	700	569	621	595	712	598	645	602	632	569	514	554	508	468	440	403	33	21	5,535	5,083
San Bruno Park	252	273	268	230	225	201	197	187	207	211	207	186	234	214	150	154	141	130			1,881	1,786
San Carlos	160	169	159	149	190	163	172	156	187	208	170	183	189	204	187	180	154	161	6	2	1,574	1,575
San Mateo City	777	794	691	659	694	620	640	652	614	579	627	568	567	530	463	471	430	410	24	12	5,527	5,295
South San Francisco	532	538	570	509	449	468	457	446	407	384	386	349	357	366	244	205	254	224	28	14	3,684	3,503
Tunis				2	0	1	3		2	1	2		2		1			1			10	5
Woodside	16	18	17	13	21	15	18	19	25	15	18	17	20	17	16	19	16	20			167	153
County Service							1				1		1		1		4		108	51	116	51
Totals—Elementary	4548	4588	4377	3957	4036	3735	4090	3729	3787	3677	3678	3410	3445	3417	2889	2693	2634	2466	258	158	33,742	31.830

School district	9		10		11		12		Ungraded		Total		Grand total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
High Schools:														
Half Moon Bay	34	23	37	21	32	28	19	27	16	17	138	116		
Jefferson	395	338	354	341	260	285	200	198	217	523	1,426	1,685		
Pescadero	13	12	12	9	11	10	12	5			48	36		
San Mateo	853	908	879	884	680	729	602	563	10	15	3,024	3,099		
Sequoia	1,103	1,102	1,018	979	832	795	666	669	1,323	2,766	4,952	6,311		
South San Francisco	281	244	186	194	102	168	105	118	273	615	955	1,339		
County service	5	3	12	5	7	3	4	1			28	12		
Totals—High schools	2,634	2,630	2,498	2,433	1,984	2,018	1,606	1,581	1,849	3,936	10,571	12,598	44,813	44,428

TABLE NO. 2

PROJECTED ENROLLMENT IN THE REGULAR CLASSES OF SAN MATEO COUNTY SCHOOL DISTRICTS

(Grades K through 12)

Grade	51-52 actual	52-53 actual	53-54 actual	54-55 actual	55-56 actual	56-57 actual	57-58 actual	1958-59 estimate	1959-60 estimate	1960-61 estimate	1961-62 estimate	1962-63 estimate	1963-64 estimate	1964-65 estimate
K	5,996	6,051	6,912	7,442	7,852	8,514	9,136	9,636	10,136	10,636	11,036	11,436	11,836	12,236
1	5,171	6,606	6,608	7,264	7,787	7,836	8,334	8,953	9,443	9,933	10,423	10,815	11,207	11,599
2	4,377	4,971	6,335	6,628	7,270	7,787	7,771	8,334	8,953	9,443	9,933	10,423	10,815	11,207
3	4,537	4,547	5,055	6,522	6,872	7,374	7,819	7,848	8,334	8,953	9,443	9,933	10,423	10,815
4	4,032	4,526	4,594	5,184	6,671	7,007	7,464	7,897	7,926	8,334	8,953	9,443	9,933	10,423
5	3,314	4,203	4,727	4,730	5,367	6,815	7,088	7,538	7,975	8,005	8,334	8,953	9,443	9,933
6	3,054	3,467	4,237	4,862	4,902	5,494	6,862	7,158	7,613	8,054	8,085	8,334	8,953	9,443
7	2,822	3,186	3,588	4,497	4,967	5,049	5,582	6,999	7,229	7,689	8,134	8,165	8,334	8,953
8	2,641	2,985	3,322	3,682	4,660	5,092	5,100	5,999	7,138	7,301	7,765	8,215	8,246	8,334
9	2,534	2,739	3,152	3,501	3,917	4,806	5,264	5,202	6,118	7,280	7,374	7,842	8,297	8,328
10	2,167	2,568	2,808	3,181	3,639	4,003	4,931	5,369	5,306	6,240	7,425	7,447	7,920	8,379
11	1,912	2,119	2,453	2,719	3,159	3,518	4,002	4,832	5,315	5,252	6,177	7,350	7,372	7,840
12	1,634	1,792	1,975	2,312	2,519	2,911	3,187	3,721	4,493	4,942	4,884	5,744	6,835	6,855
Other	168	161	220	273	306	373	478	575	650	730	800	850	900	950
Total	44,359	49,921	55,986	62,797	69,888	76,579	83,018	90,061	96,629	102,792	108,766	114,950	120,514	125,295

* Applies to ungraded but regular full-time students attending special education classes for physically handicapped and mentally retarded.

TABLE NO. 3

PROJECTION OF TOTAL FALL REGULAR FRESHMAN ENROLLMENT TO 1970 FOR A POSSIBLE STATE COLLEGE IN SAN MATEO COUNTY *

Year	San Mateo County High School graduates (prior year)*	Freshmen from San Mateo County at 263.5 per 1000†	Santa Clara County High School graduates (prior year)	Freshmen from Santa Clara County at 73 per 1000‡	Total freshmen both counties	Freshmen from other areas 20 percent of total enrollment**	Total regular freshmen	Total college enrollment††
1958	2,481	653	4,100	299	1,115	279	1,231	4,309
1959	2,525	664	4,800	350	1,245	311	1,556	4,637
1960	3,225	850	5,700	416	1,549	387	1,653	4,786
1961	3,492	920	6,600	482	1,720	430	1,832	6,412
1962	3,548	935	7,000	511	1,749	437	1,883	6,591
1963	3,947	1,040	7,300	533	1,903	476	2,049	7,172
1964	4,893	1,313	9,300	681	2,446	611	2,605	9,118
1965	5,071	1,336	9,500	693	2,511	628	2,657	9,300
1966	5,284	1,393	10,900	796	2,720	680	2,869	10,042
1967	5,571	1,468	11,600	847	2,902	725	3,040	10,640
1968	5,915	1,559	11,200	818	2,979	745	3,121	10,924
1969	6,308	1,660	12,000	876	3,221	805	3,341	11,694
1970	6,578	1,733	13,500	986	3,463	865	3,584	12,544

* This projection excludes the South San Francisco and Jefferson High School Districts on the assumption that a certain number of these students would attend San Francisco State.
† Figures based on ratios in Table 42 and Table 30, modified on the basis of eligibility.
‡ Figures based on ratios in Table 42 and Table 30, modified on the basis of eligibility.
** Conservative estimate based on figures at San Jose State (27.7 percent) and Fresno State (21.5 percent).
†† This total arrived at by using the factor of 3.5 of the freshmen enrollment. (See page 64 of the Study.)

TABLE NO. 4

PROJECTION OF TOTAL FALL REGULAR ENROLLMENT BY CLASS LEVEL TO 1970 FOR A POSSIBLE STATE COLLEGE IN SAN MATEO COUNTY

Year	Freshmen G.P.R. 0.75	Sophmore G.P.R. 1.20	Junior G.P.R. .90	Senior G.P.R. .45	Graduate	Total regular enrollment
1958	1,231					
1959	1,325	923				
1960	1,653	994	1,108			
1961	1,832	1,240	1,193	997		
1962	1,883	1,374	1,488	1,074	449	6,268
1963	2,049	1,412	1,649	1,339	480	6,929
1964	2,605	1,537	1,694	1,484	603	7,923
1965	2,657	1,954	1,844	1,525	668	8,648
1966	2,869	1,993	2,345	1,660	686	9,553
1967	3,040	2,152	2,392	2,111	747	10,452
1968	3,121	2,280	2,582	2,153	950	11,086
1969	3,341	2,341	2,736	2,324	1,009	11,751
1970	3,584	2,506	2,809	2,487	1,046	12,432

TABLE 5

POPULATION ESTIMATES FOR SAN BERNARDINO COUNTY

San Bernardino County Planning Commission

February 3, 1958

Revised September 15, 1958

SAN BERNARDINO COUNTY POPULATION BREAKDOWN:		
1950 U. S. Census Figures:		
Desert	37,167	
Valley (southwest portion)	239,471	
Mountains	5,004	
Total County	281,642	
July 1, 1957, Estimates:		
Desert	79,500	
Valley (southwest portion)	361,000	
Mountains	10,500	
Total County	451,000	
		July 1,1958 estimates
January 1, 1958, Estimates:		
Incorporated area total	256,000	260,000
Unincorporated area total	210,000	215,400
Total County	466,000	475,400
SAN BERNARDINO COUNTY POPULATION:		
1950 U. S. Census	281,642	
1957 July 1st estimate	451,000	
1958 January 1st estimate	466,000	
1960 Estimate	512,000	515,000
1965 Estimate	632,000	660,000
1970 Estimate	821,000	847,000
1975 Estimate	980,000	1,086,000
1980 Estimate	1,160,000	1,393,000

TABLE 6

POPULATION

San Bernardino County

Census figures:	
1930	133,900
1940	161,108
1950	281,642

California Taxpayer's Association Estimates:	
1/1/53	335,300
1/1/54	361,800
1/1/55	386,500
1/1/56	418,203
1/1/57	437,200
1/1/58	464,400

Incorporated Cities, San Bernardino County

Barstow (Inc. 9/3/47)	
1950	6,135
1955	9,000
1957	10,017*

Chino (Inc. 3/5/10)	
1950	5,784
1955	7,465*
1957	8,981†

Colton (Inc. 7/20/87)	
1950	14,465
1953	15,381
1955	17,321*
1958	18,873‡

Fontana (Inc. 6/25/52)	
1954	13,695
1956	15,000¶

Montclair (Inc. 4/25/56)	
1956	8,008*
1957	9,900§

Needles (Inc. 10/30/13)	
1950	4,051
1956	5,500*

Ontario (Inc. 10/10/91)	
1950	22,872
1956	39,432*
1957	41,641*

Redlands (Inc. 12/7/88)	
1950	18,429
1955	21,266*
1958	25,711*

Rialto (Inc. 11/17/11)	
1950	3,156
1956	11,780*
1957	15,359*

San Bernardino (Inc. 8/10/69)	
1950	63,058
1956	83,145*
1957	89,062

Upland (Inc. 5/15/06)	
1950	9,203
1953	11,104*
1956	12,639*

Unincorporated Areas

7/1/57 County Planning Department Estimates	
Adelanto Area	1,200
(Special Census 1956—1,436)	
Alta Loma	1,755
Amboy	610
Apple Valley	4,500
(Special Census 1956—3,295)	
Atolia	30
Baker	735
Big Bear Lake Area	3,810
(1950 Census—1,434)	
Bloomington Township	18,870
Bryn Mawr	700
Crestline Area	1,540
(1950 Census—1,369)	
Cucamonga	6,580
(1950 Census—1,255)	
Daggett	550
Devore-Verdemont Area	1,700
Earp-Vidal Area	500
East Highland Area	1,985
Etiwanda	1,675
Guasti	640
Harlem Springs	3,560
Hesperia	2,010
Highland	6,250
Hinkley	900
Joshua Tree	2,700
Kelso	300
Lake Arrowhead Area	1,900
Lenwood	2,000
Loma Linda Area	2,500
Lucerne Valley	1,900
Ludlow	275
Mentone	2,100
Mt. Baldy	400
Muscoy	4,455
Newberry	700
Nipton-Ivanpah	210
Oro Grande	600
Patton	4,500
Phelan	350
Red Mountain	260
Trona	3,760
(1950 Census—2,450)	
Twentynine Palms	3,060
(1950 Census—1,022)	
Victorville	7,410
Wrightwood	990
Yermo	695
Yucaipa Township	11,870
Yucca Valley	2,000

* Special census
† City estimate
‡ Special census, April.
¶ Tax Association estimate.
§ County Planning Department estimate.

Compiled by San Bernardino County Board of Trade, 196 West Third Street, San Bernardino, 8/25/58.

TABLE 7

STATISTICS OF COUNTY GROWTH

San Bernardino County Board of Trade, 196 West Third Street, San Bernardino

Retail Sales (Sales Management)

1939	$59,747,000
1941	69,438,000
1948	246,338,000
1950	289,490,000
1951	318,621,000
1952	320,137,000
1953	361,713,000
1954	382,629,000
1955	438,727,000
1956	476,737,000
1957	549,234,000

County Bonded Indebtedness (County Auditor)

1940	$775,000
1945	500,000
1950	225,000
1952	115,000
1953	61,000
1954	7,000
1955	0
1956	1,000
1957	6,001,000
1958	7,731,000

Telephones (State C of C Research Department)

1940	22,734
1950	59,741
1952	72,866
1953	79,062
1954	85,887
1955	94,779
1956	106,262
1957	122,946

Building Permits Evaluation (County Building Department)

1946	$47,239,384
1948	55,995,704
1949	48,867,293
1950	63,038,525
1951	66,097,864
1952	86,552,131
1953	97,163,201
1954	99,936,884
1955	139,276,375
1956	162,129,971
1957	140,953,414

Value of Agriculture (County Department of Agriculture)

1945	$94,462,841
1950	91,307,043
1951	105,974,750
1952	106,690,921
1953	112,543,812
1954	98,488,660
1955	108,352,100
1956	118,418,009
1957	115,797,842

Assessed Valuation (County Auditor)

1940	$142,938,568
1945	180,191,930
1950	284,334,200
1952	344,033,200
1953	385,646,720
1954	412,790,270
1955	576,422,360
1956	599,144,100
1957	669,161,950
1958	749,272,630

County Tax Rate (County Auditor)

1940	1.7396
1945	1.66
1950	2.10
1952	1.88
1953	1.88
1954	1.86
1955	1.45
1956	1.38
1957	1.48
1958	1.48

Registered Voters (County Registrar of Voters)

1940	88,089
1944	86,772
1946	100,348
1948	122,345
1950	130,055
1952	152,873
1954	154,484
1956	176,541
1958	192,717

Dwelling Permits Issued (County Building Department)

1946	7,296
1948	5,203
1949	4,585
1950	7,039
1951	5,856
1952	7,993
1953	10,080
1954	10,771
1955	13,706
1956	10,749
1957	10,721

Value of Minerals (State Chamber of Commerce Research)

1945	$23,038,011
1950	48,351,102
1951	55,529,399
1952	53,351,806
1953	60,835,343
1954	67,427,332
1955	72,339,147
1956	81,932,000

TABLE 7—Continued

WAGE AND SALARY EMPLOYMENT IN SAN BERNARDINO COUNTY

(State Department of Employment—Research and Statistics)

	1940	*1945*	*1950*	*1955*	*1957*
TOTAL	49,414	78,900	87,075	117,050	139,760
Agriculture	9,291	9,500	11,750	13,900	13,200
Construction	2,840	3,950	5,200	7,500	12,150
Manufacturing	4,976	9,550	13,700	18,250	19,840
Transportation, communication, public utilities	5,952	7,500	7,625	8,000	8,680
Trade	11,572	15,450	19,775	25,000	30,380
Finance, Ins., Real Estate	1,204	1,800	2,275	3,500	4,280
Service	10,214	14,450	18,600	23,000	32,550
Government	1,688	15,250	7,500	17,000	17,500
Other	1,677	1,450	650	900	1,180

Total wages in all industries—1957 ..... $338,243,408

	Annual wage	*Value added by manufacturing*
1947	$34,467,000	$75,795,000
1952	67,363,090	112,038,792
1955	85,184,093	178,886,595
1957	98,316,000	186,610,400

Average daily attendance in all county schools
(County School Department)

1946-47	42,481
1947-48	45,167
1948-49	48,091
1949-50	50,369
1950-51	52,958
1951-52	57,489
1952-53	62,879
1953-54	69,108
1954-55	74,603
1955-56	82,233
1956-57	90,395
1957-58	104,266

Motor vehicle registrations
(Motor Vehicle Department)

1940	69,406
1945	79,075
1950	130,161
1951	141,342
1952	150,901
1953	166,882
1954	176,627
1955	195,886
1956	215,495
1957	230,059

TABLE 8

ESTIMATED TOTAL COUNTY POPULATION FOR MONTEREY, SANTA CRUZ, AND SAN BENITO COUNTIES, JULY 1, 1958, WITH 1950-1958 CHANGE

	Total population			
County	*Census April 1, 1950*	*Estimates* [a] *July 1, 1958*	*Change*	*Percent*
Monterey	130,498	192,200	61,700	47.3
Santa Cruz	66,534	71,200	4,700	7.0
San Benito	14,370	15,500	1,100	7.9
Total	211,402	278,900	67,500	31.9

[a] These figures taken from Table 11, "California Population in 1958," Department of Finance, Sacramento, July, 1958.

TABLE 9

NUMBER OF PUBLIC HIGH SCHOOL GRADUATES IN MONTEREY, SANTA CRUZ, AND SAN BENITO COUNTIES IN 1950-51 AND IN 1956-57

	Public high school graduates		
County	*1950-51*	*1956-57*	*Percent increase*
Monterey	853	1,030	20.8
Santa Cruz	492	678	37.8
San Benito	109	139	27.5
Total	1,454	1,847	27.0

TABLE 10

ESTIMATED NUMBER OF PUBLIC HIGH SCHOOL GRADUATES IN MONTEREY, SANTA CRUZ, AND SAN BENITO COUNTIES

By Years 1956-57 to 1969-70

Year	*Monterey, Santa Cruz, and San Benito Counties* Number	*Year*	*Monterey, Santa Cruz, and San Benito Counties* Number
1956-57 [a]	1,847	1963-64	2,900
1957-58	1,800	1964-65	3,200
1958-59	2,000	1965-66	3,300
1959-60	2,300	1966-67	3,300
1960-61	2,500	1967-68	3,400
1961-62	2,500	1968-69	3,500
1962-63	2,500	1969-70	3,600

SOURCE: Data for 1956-1957 from California Department of Education, Bureau of School Apportionments and Reports; 1958-1970 estimated by California Department of Finance.

[a] The figures for this year are actual ones.

TABLE 11

NUMBER OF NEW REGULAR STUDENTS FROM MONTEREY, SAN BENITO, AND SANTA CRUZ COUNTIES

	Year				
Monterey County	*Fall 1953*	*Fall 1954*	*Fall 1955*	*Fall 1956*	*Fall 1957*
No. entering San Jose State College	81	72	115	103	82
No. entering all state colleges	120	134	172	158	Not avail.
San Benito County					
No. entering San Jose State College	20	13	14	13	12
No. entering all state colleges	28	19	34	24	Not avail.
Santa Cruz County					
No. entering San Jose State College	112	85	107	91	81
No. entering all state colleges	139	122	144	114	Not avail.
Totals					
No. entering San Jose State College	213	170	236	207	175
No. entering all state colleges	287	275	350	296	Not avail.

TABLE 11—Continued

NUMBER OF NEW REGULAR FRESHMEN FROM MONTEREY, SAN BENITO, AND SANTA CRUZ COUNTIES

	Year				
	Fall 1953	*Fall 1954*	*Fall 1955*	*Fall 1956*	*Fall 1957*
Monterey County					
No. entering San Jose State College	31	15	23	26	29
No. entering all state colleges	52	49	53	51	58
San Benito County					
No. entering San Jose State College	14	6	8	8	7
No. entering all state colleges	19	11	18	16	11
Santa Cruz County					
No. entering San Jose State College	62	39	45	42	50
No. entering all state colleges	77	63	64	53	72
Totals					
No. entering San Jose State College	107	60	76	76	86
No. entering all state colleges	148	123	135	120	141

APPENDIX II

MR. ROY E. SIMPSON'S PROPOSAL FOR A NEW STATE BOARD OF EDUCATION

Assembly Constitutional Amendment No.

A resolution to propose to the people of the State of California an amendment to the Constitution of said State by amending Section 2 of Article IX of said Constitution, relating to education.

Resolved by the Assembly, the Senate concurring, That the Legislature of the State of California at its 1959 Regular Session, commencing on the fifth day of January, 1959, two-thirds of all members elected to each of the two houses of the Legislature voting in favor thereof, hereby proposes to the people of the State of California that Section 2 of Article IX of the Constitution of the State be amended as follows:

Sec. 2. ~~A Superintendent of Public Instruction shall, at each gubernatorial election after the adoption of this Constitution, be elected by the qualified electors of the State. He shall receive a salary equal to that of the Secretary of State, and shall enter upon the duties of his office on the first Monday after the first day of January next succeeding his election.~~ *There is hereby created a State Board of Education which shall consist of 11 members, to come into being the first Monday after the first day of January 1963. The members of the State Board of Education in existence on January 1, 1963, shall serve as members of the board hereby created until the expiration of the terms for which they were appointed. Thereafter members of the board shall be appointed by the Governor with the advice and consent of the Senate for the following terms, commencing on the fifteenth day of January of the respective years: two terms shall be four years, each commencing in 1963; one term shall be five years, commencing in 1963; one term shall be five years, commencing in 1964; one term shall be six years, commencing in 1964; one term shall be seven years, commencing in 1964; one term shall be seven years, commencing in 1965; one term shall be eight years, commencing in 1965; one term shall be eight years, commencing in 1966; one term shall be nine years, commencing in*

1966; one term shall be 10 years, commencing in 1966. Thereafter two 10-year terms shall commence on January 15, 1967, and each decennial thereof, and one 10-year term shall commence on January 15 of each other succeeding year. An appointee to fill a vacancy shall hold office only for the balance of the unexpired term.

The board is the successor to and is vested with all the duties, powers, purposes, responsibilities and jurisdiction of the State Board of Education, the Superintendent of Public Instruction, the Director of Education and the Department of Education.

Said board is invested with full powers to govern and operate the state colleges without restriction by other state agencies, subject only to such legislative control as may be necessary for the security of funds donated or appropriated for its use. Subject to and in conformity with statutes now in effect and with such statutes not inconsistent with this section as the Legislature enacts hereafter, the board shall have supervision of and control over all other components of the public school system and may establish rules to make effective the laws and policies of the state relating to education in such other public schools and exercise such powers and perform such other duties as are prescribed by law for such other public schools.

The board shall have power to adopt rules for itself and for its officers and employees. Annually the board shall elect one of its members president.

The board shall appoint a Superintendent of Public Instruction, who shall be exempt from civil service, whose term of office shall be four years, and whose qualifications shall be determined by and whose salary shall be fixed by the board. The Superintendent of Public Instruction shall be the chief executive and administrative officer of the board and, subject to the direction and control of the board, shall carry out and enforce the educational policies and directives adopted and issued by the board. The State Board of Education, on nomination of the Superintendent of Public Instruction, shall appoint an administrative officer for the state colleges whose term of office shall be four years. Said administrative officer for the state colleges and his professional assistant shall be exempt from civil service, and their salaries shall be fixed by the board.

APPENDIX III

LEGISLATIVE COUNSEL'S OPINION

STATE OF CALIFORNIA
OFFICE OF LEGISLATIVE COUNSEL
SACRAMENTO, CALIFORNIA, August 8, 1958

Analysis of Proposed Constitutional Amendment Relating to the State Board of Education and the Superintendent of Public Instruction—#3837

Creation of New Board

Creates a new State Board of Education, consisting of 11 members, to come into existence in January, 1963. The members of the existing State Board of Education will serve as members of the new board

until the expiration of their terms. Thereafter the members shall be appointed by the Governor with the advice and consent of the Senate, for 10-year staggered terms.

General Powers of New Board

Makes the new board the successor to, and vests it with, all the powers, duties, purposes, responsibilities and jurisdiction of the State Board of Education, the Superintendent of Public Instruction, the Director of Education, and the Department of Education.

Vests new board with power to make rules for itself and its officers and employees.

Powers of New Board Over State Colleges

Vests new board with full powers to govern and operate the state colleges, subject only to such control by the Legislature as may be necessary for the security of funds donated or appropriated for its use. Makes such power of new board over state colleges unrestricted by the state agencies. Requires the new board, on recommendation of the Superintendent of Public Instruction, to appoint an administrative officer for the state colleges, with a four-year term.

Exempts administrative officer and his professional assistants from civil service and requires the new board to fix their salaries.

Powers of New Board Over Rest of Public School System

Gives the new board, subject to and in conformity with statutes now in effect and with such statutes not inconsistent with the proposed constitutional amendment as the Legislature hereafter enacts, the supervision of and control over all other components of the Public School System * and the power to establish rules to make effective the laws and policies of the State relating to education in such other public schools and to exercise such powers and perform such other duties as are prescribed by law for such other public schools.

Powers of New Board Over Superintendent of Public Instruction

Repeals existing provision for election of Superintendent of Public Instruction.

Requires new board to appoint a Superintendent of Public Instruction for a four-year term, who is exempt from civil service, and whose qualifications and salary shall be fixed by the new board.

Makes the superintendent the chief executive and administrative officer of the new board. Requires him, subject to direction of the board, to carry out and enforce the policies and directives adopted and issued by the board.

RALPH N. KLEPS
Legislative Counsel
By BARBARA COCHRANE CALAIS, *Deputy*

* The State Constitution provides:
"The Public School System shall include all kindergarten schools, elementary schools, secondary schools, technical schools, and state colleges, established in accordance with law and, in addition, the school districts and the other agencies authorized to maintain them" (Cal. Const., Art. IX, Sec. 6).

APPENDIX IV

PRESENT DUTIES OF VARIOUS AGENCIES WITH REGARD TO THE STATE COLLEGES

STATE OF CALIFORNIA
OFFICE OF LEGISLATIVE COUNSEL
SACRAMENTO, CALIFORNIA, August 7, 1958

HON. DONALD D. DOYLE
Lafayette, California

State Colleges—#3752

DEAR MR. DOYLE: You have requested a list of the powers and duties, prescribed by law, of the Legislature and various state agencies and officers with respect to state colleges. We have listed such powers and duties below.

1. Legislature

The Legislature has plenary power over the state colleges, except where limited by the State Constitution.[1] One specific limitation on the Legislature in respect to state colleges is that the Legislature may not transfer any state college from the Public School System,[2] or place a state college under the jurisdiction of any authority other than one included within the Public School System.[2] The only other specific limitation is that at least $60,000,000 of the proceeds of the state construction program bonds be made available for state college construction purposes.[3]

2. Director of Education

Is in charge of state colleges for purposes of administration. (Sec. 20341)[4]

Shall control and expend all money appropriated for support and maintenance of state colleges and money received as donations. (Sec. 20342.)

Shall prescribe length of and time for vacations of noncivil service state college employees. (Sec. 20251.)

May contract with Federal Government for education of persons in federal service in state colleges. (Sec. 20253.)

May contract with various entities for performance of services by state colleges. (Sec. 20254.)

With approval of State Board of Education, may enter into contracts on behalf of a state college for participating in or procuring television broadcasts for use in educational program of the college. (Sec. 20255, as added by Statutes of 1957, Chapter 907.)

May contract with hospital for furnishing of clinical facilities in connection with approved state college programs requiring such facilities and experience. (Sec. 20255, as added by Statutes of 1957, Chapter 1167.)

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[1] See *In re Madera Irrigation District*, 92 Cal. 296.
[2] Cal. Const., Art IX, Sec. 6. The Public School System "includes all kindergarten schools, elementary schools, secondary schools, and state colleges, established in accordance with law and, in addition, the school districts and other agencies authorized to maintain them" (Cal. Const., Art IX, Sec. 6).
[3] Cal. Const., Art XVI, Sec. 4½.
[4] Except where otherwise indicated all section references are to sections of the Education Code.

Required to pay accreditation costs for state colleges accredited by or belonging to accreditation associations or organizations. (Sec. 20342.1.)

May authorize collection of tuition, transcript, placement and other special fees and deposits from students or prospective or former students. (Secs. 20343, 20343.2, and 20343.3.)

May prescribe regulations subject to approval of Department of Finance for refund of student fees. (Sec. 20343.1.)

Must fix admission fee and rate of tuition for nonresident students. (Sec. 20345.1.)

Must designate person at each college or administer oaths relating to residence status. (Sec. 20345.4.)

Must prescribe manner of holding election for establishment of student body organization and must fix student fee for membership in such organization. (Sec. 20345.5.)

Must approve purposes for which funds of student body organizations are available. (Sec. 20345.7.)

Must prescribe rules, subject to approval of and audit by Department of Finance, concerning collection, custody and disposition of money collected by state colleges. (Sec. 20346.)

May present matters affecting state colleges at joint meeting of State Board of Education and representatives of state colleges. (Sec. 20350.)

May rent unneeded space in state college buildings to student and faculty organizations for nonprofit co-operative stores and must fix reasonable rental. (Sec. 20351.)

May authorize organization maintaining co-operative store on campus to establish and maintain cafeteria in connection with store. (Sec. 20352.)

May provide for establishment and maintenance of cafeterias in colleges. (Sec. 20353.)

Subject to approval of Department of Finance, may lease state college property to nonprofit organizations of college students and faculty for purposes related to activities of college or of organizations. (Sec. 20354.)

With approval of Director of Finance, may lease state college land to nonprofit organization to be used for purpose of building and using student living quarters for meeting places for student organizations. (Sec. 20354.2.)

Authority of state college president to lease state college property for purposes which will not interfere with purposes of college is subject to approval of Director of Education and Director of Finance. Each director may exempt certain types of transactions from requiring his approval. (Sec. 20354.5.)

The authority of state college presidents to require unmarried minor students not living at home to reside in dwelling approved by college is subject to approval of director. (Sec. 20355.5.)

With approval of Director of Finance, must fix rents, charges and fees required of students using student housing facilities operated by college. (Sec. 20356.)

Allows refunds of rents, charges and fees by Department of Education pursuant to regulation prescribed by Director of Education and approved by Department of Finance. (Sec. 20357.)

Must appoint members of state college advisory board, and fill vacancies, subject to confirmation by State Board of Education. Must fix terms of first members. (Sec. 20361 to 20363.)

Appoints presidents of state colleges subject to approval of State Board of Education. (Sec. 20371.)

Appoints members of teaching staff of each state college and all officers and employees of college subject to approval of State Board of Education, upon recommendation of president of college. (Secs. 20372 and 20392.) May make temporary appointments. May appoint student assistants, extension service instructors, and officers and employees and teaching staff members for state college summer sessions upon recommendation of president of the college. (Sec. 20372.)

Prescribes, subject to approval of State Board of Education, the duties of all presidents, members of teaching staff, officers and employees of state college. (Sec. 20373.)

Classifies various academic positions. (Sec. 20373.)

May, on recommendation of president of state college, grant leave of absence, without compensation, to state college employees. (Secs. 20376 and 20377.)

May grant sabbatical leaves of absence with pay to state college employees. (Sec. 20381.) Subject to rules of State Board of Education, may prescribe standards of service which entitle employee to sabbatical leave. (Sec. 20382.)

With approval of Director of Finance may enter agreement with faculty member granted sabbatical leave for performance of service by faculty member during leave. (Sec. 20383.)

Must approve purpose of study of certain faculty members granted sabbatical leave. (Sec. 20383.5.)

May grant state college employees leave of absence without pay after employee has had sabbatical leave with pay. (Sec. 20384.)

Must adopt rules relating to notice of rejection of probationary nonacademic employee and of notice of intention not to recommend reappointment of academic teaching and administrative employee without permanent status. (Sec. 20395.)

Must adopt rules governing order of layoff of employees laid off for lack of funds or work and governing re-employment of employees laid off. (Sec. 20397.)

May authorize state college president or faculty member to attend educational meetings and conferences. (Sec. 20404.)

May perform acts under agreement with Federal Government for education of veterans. (Sec. 20405.)

May authorize state college president to establish extension and field services. (Sec. 20406.)

With approval of Director of Finance, may enter agreement with school district for use by state college of district building for laboratory demonstration elementary school. (Sec. 20411.)

May, on recommendation of faculty and president, exclude students. (Sec. 20432.)

Requires director to establish, with approval of State Board of Education, courses for training teachers in subjects for which special credentials are granted and to grant diplomas of graduation therefor. (Sec. 20452.)

Requires director to establish, with approval of State Board of Education, such additional teacher-training courses as are authorized by law or by State Board of Education in accordance with law. (Sec. 20452.)

Requires director, when authorized to do so by State Board of Education, to establish and maintain courses of instruction and teacher-training leading to a baccalaureate or master degree, and grant the degree. (Sec. 20452.)

Requires the director to establish and maintain courses of study only in accordance with rules and regulations prescribed by State Board of Education. (Sec. 20452.)

Allows the director, with the approval of the State Board of Education, to establish courses in military science and tactics. (Secs. 20454 and 20454.1.)

May establish and maintain model and training schools from kindergarten to junior high school grade and require state college students to teach classes at schools. (Sec. 20455.)

Authority of state college to conduct a summer session is subject to approval of director. (Sec. 20471.)

Prescribes rules for collection of tuition fees from summer session students. (Sec. 20472.) May authorize collection of special fees from summer session students. (Sec. 20473.)

May, upon recommendation of state college faculty, issue diplomas of graduation and master degrees to state college students. (Sec. 20482.)

Selects two state college presidents to be members of Commission for Vocational Education. (Sec. 24090.)

Requires director to provide for purchase of apparatus, furniture, equipment, stationery and textbooks for use of state college students. (Sec. 20502.)

May enter agreement with Federal Government relating to construction, maintenance and use of wind tunnel at San Diego State College. (Sec. 20503.)

Power of Fresno State College to make rules for operation and maintenance of the summer school of music is subject to approval of director. (Sec. 20521.)

May, with approval of Department of Finance, authorize fee to be charged at Fresno Summer School of Music. (Sec. 20522.)

Expenditures of funds from Fresno Summer School of Music Fund must be approved by Director of Education. (Sec. 20523.)

May, with approval of Director of Finance, accept on behalf of State, gifts, donations, bequests and devises to state colleges. (Sec. 184.)

May enter agreements with school district for practice teaching in district schools by state college students. (Sec. 8052.)

3. *Superintendent of Public Instruction*

Must visit and inspect each state college from time to time, inquire into its condition and management, require such reports as he may deem proper from the teachers of the school, and exercise general supervision over the colleges. (Sec. 148.)

Must report annually to Governor a statement of condition of state colleges. (Sec. 149.)

May enter agreements with Federal Government relating to establishment of courses of study in aeronautics in state colleges. (Sec. 10605.)

4. Department of Education

May refund rents, charges, and fees collected from students pursuant to regulations prescribed by Director of Education and approved by Department of Finance. (Sec. 20357.)

May obtain insurance in connection with driver training program at state colleges. (Sec. 20359.)

Designates state colleges which must prepare students to become teachers of elementary agriculture. (Sec. 20457.)

May authorize establishment of teacher training program for teachers of handicapped and mentally retarded children. (Sec. 20463.)

Must determine fee which San Francisco State College must charge parent or guardian of child admitted to child care center maintained at college. (Sec. 20512.)

May appoint persons to constitute security patrol for each state college. (Sec. 20621.)

5. State College President

In capacity as state college representative at joint meeting of State Board of Education and the representatives of the state colleges, may present matters affecting the colleges. (Sec. 20350.)

With approval of Director of Education and Director of Finance may let property of college for any purpose which will not interfere with requirements of the college. (Sec. 20354.5.)

With approval of Director of Education may require unmarried minor students not living at home to reside in approved dwellings. (Sec. 20355.5.)

Is executive secretary of advisory board of state college. (Sec. 20364.) Must keep Director of Education fully informed with respect to activities of advisory board and immediately following each board meeting must forward to director a complete report of the meeting, including all recommendations made by the board. (Sec. 20367.)

Recommends persons appointed by Director of Education, subject to approval of State Board of Education, as members of teaching staff and officers and employees of the college. (Secs. 20372 and 20392.)

May budget amount to be expended pursuant to rules of State Board of Control for use in carrying out the community relation responsibility of his office as defined by State Board of Education. (Sec. 20373.1.)

Recommends to Director of Education persons who may be granted leave of absence without compensation. (Secs. 20376 and 20377.)

May establish extension and field services if authorized by Director of Education. (Sec. 20406.)

May accept, without approval of Director of Finance, gifts of money for use as student loan fund or for scholarships, and expend money in accordance with terms of the gift. (Sec. 184.2.)

May grant temporary exemption from physical education course to students who are ill or injured and to part-time students. (Sec. 30459.)

6. State College Advisory Board

Must consult and advise with president of the college with respect to improvement and development of the college. (Sec. 20365.)

7. Council of State College Presidents

Our examination of the laws has revealed no law which creates a council of state college presidents.

8. State Board of Education

Must prescribe rules for the government of the state colleges and for the reports of officers and teachers of the colleges and for visiting other schools and institutions. (Secs. 112, 20347.)

Requires annual meeting to consider and act on matters pertaining to the state colleges. (Sec. 20348.)

May adopt rules and regulations for government of state colleges after due presentation and consideration of matters affecting state colleges, presented at joint meeting of State Board of Education and representatives of the state colleges. (Sec. 20350.)

Appointment by Director of Education of members of each state college advisory board is subject to confirmation by state board. (Secs. 20361 and 20363.)

The appointment by the Director of Education of president of each state college is subject to the approval of the state board. (Sec. 20371.)

The appointment by the Director of Education of the teaching staff and officers and employees of each college is subject to the approval of the state board. (Secs. 20372 and 20392.)

The power of the Director of Education to prescribe the duties of state college presidents, teaching staffs and officers and employees, is subject to the approval of the State Board of Education. (Sec. 20373.)

May determine term, not exceeding four years, of president, faculty member, or other college employee who has served successfully for two years. (Sec. 20374.)

May agree upon additional compensation which may be received by state college faculty member engaged to instruct in extension work, evening work, special Saturday work, or summer session work. (Sec. 20375.)

The power of the Director of Education to prescribe the standards of service which will entitle a state college employee to a sabbatical leave is subject to the rules of the State Board of Education. (Sec. 20382)

May waive indemnity bond of state college employee on leave of absence with pay. (Sec. 20384)

At joint meeting of the state board and the representatives of the state colleges, the board may adopt rules for the government of the state colleges, prescribing the standards for students entering the state colleges and the rules for transfer of students from one college to another. (Sec. 20426)

The admission of students to state colleges must be in accordance with rules of the state board. (Sec. 20428)

The power of the Director of Education to establish various courses of study in the state colleges is subject to the approval or authorization of the State Board of Education and must be in accordance with the rules prescribed by the state board. (Sec. 20452)

At the joint meeting of the State Board of Education and the representatives of the state colleges, the state board may adopt rules for the government of the state colleges with respect to standardizing of courses of instruction for the preparation of teachers and the establishment and conducting in state colleges of courses for training teachers in the subjects for which special certificates of the elementary or secondary grade are granted. (Sec. 20453)

The power of the Director of Education to establish courses in military science and tactics is subject to the approval of the state board. (Sec. 20454)

Must prescribe a course in fire prevention and make completion of the course a requirement for graduation. (Sec. 20458)

Must prescribe a course in physical education in the state colleges. (Sec. 20459)

May establish courses for giving instruction in testing sight and hearing of public school pupils. (Sec. 20462)

At the joint meeting of the State Board of Education and of the representatives of the state colleges, the board may adopt rules and regulations for the determination of the time and standards for graduation from state colleges, and prescribing the standards for granting degrees by the state colleges, for the establishing of standards for the maintenance of collegiate and degree-granting status by any of the state colleges, and for the authorizing of a state college to grant degrees. (Sec. 20481.)

At the joint meeting of the State Board of Education and the representatives of the state colleges, the board may adopt rules and regulations for the government of the state colleges in prescribing the use of the state series of textbooks. (Sec. 20501.)

The board has various powers under the "State College Revenue Bond Act of 1947" which allow it to construct, operate and control dormitories or other housing facilities for the use of students, faculty, and other employees of state colleges, and to issue revenue bonds to finance such projects. (Secs. 20541-20607.)

Must prescribe course in public safety and make the completion of the course a requirement for graduation. (Sec. 10173.)

Must grant appropriate teaching credentials to applicant who is holder of diploma granted by a state college and who has completed a teacher training course prescribed by State Board of Education, upon presentation of diploma within four months after issuance. (Sec. 12041.)

Power of Director of Education to contract on behalf of state college for participation in or procuring of television broadcast for use in educational program of the college, is subject to approval of State Board of Education. (Sec. 20255, as added by Statutes of 1957, Chapter 907.)

9. Department or Director of Finance [5]

The director may enter agreements with the Federal Government for the construction of housing or other educational facilities for students or faculty of any state college under certain conditions. (Sec. 20255, as added by Statutes of 1957, Chapter 1084.)

The department has power to approve the regulations prescribed by the Director of Education for the refund of certain fees collected from students. (Sec. 20343.1.)

The rules prescribed by the Director of Education relating to the collection, custody, and distribution of money collected by a state college are subject to the approval of and audit by the Department of Finance. (Sec. 20346.)

Leases of state college property by the Director of Education or a president of a state college are subject to the approval of the Department of Finance or the Director of Finance. (Secs. 20354, 20354.2, 20354.5.)

The power of the Director of Education to fix the rents, charges and fees of students using college housing facilities is subject to the approval of the Director of Finance. (Sec. 20356.)

The regulations prescribed by the Director of Education governing refunds of rents, charges, and fees collected in error are subject to the approval of the Department of Finance. The regulations of the Director of Education relating to refunds of rents, charges, and fees collected for facilities requested but not used by students are subject to the approval of the Director of Finance. (Sec. 20357.)

An agreement made by the Director of Education with a faculty member granted a sabbatical leave for the performance of services by the faculty member during the leave is subject to the approval of the Director of Finance. (Sec. 20383.)

Agreements between the Director of Education and school districts for the use of a district building by a state college for a laboratory demonstration elementary school are subject to the approval of the Director of Finance. (Sec. 20411.)

The fees authorized by the Director of Education to be charged at the Fresno Summer School of Music are subject to the approval of the Department of Finance. (Sec. 20522.)

Very truly yours,

RALPH N. KLEPS, Legislative Counsel

By BARBARA COCHRANE CALAIS, Deputy Legislative Counsel

[5] The powers and duties set forth below are the powers and duties of the Department of Finance and the Director of Finance which deal specifically with state colleges.

In addition, the Director and the Department of Finance have the same powers and duties with respect to state colleges as they have with respect to state agencies generally. For example, the department has general powers of supervision over all matters concerning the financial and business policies of the state, and supervises the accounting system of state agencies (Gov. C. Secs. 13070 and 13290). Each state agency must submit its budget to the department for approval and the department may revise, alter or amend any such budget (Gov. C. Secs. 13320 and 13322). The department must examine and report the books of each state agency (Gov. C. Secs. 13294, 13295).

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